The RUBBER AGE

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Late News of the Rubber Industry

Mail Order Houses Cut Prices and Adopt New Tire Warranty

MID-WINTER catalogs issued by Sears, Roebuck & Company and Montgomery Ward & Company, leading Chicago mail order houses, carry price reductions on tires ranging from 7 to 20 per cent, bringing their prices to the lowest levels they have ever quoted. At the same time the companies are reported to have adopted a modified form of tire guarantee, resembling that now used by members of the Rubber Institute.

The Riverside line of tires, of which Montgomery Ward & Company are said to have marketed 10,000,000 in a single year, was reduced from 7 per cent to 17 per cent. The All-State, Dearborn and Argosy tires of Sears, Roebuck & Company were lowered in price from 10 per cent to 20 per cent. These reductions, however, are considered only as bringing the mail order prices in line with the prices established by the leading rubber companies in November and are not expected to have any bearing on the price schedules of the regular manufacturers.

In its catalog Sears, Roebuck has replaced the 25,000-mile guarantee on its Super All-State tires and the 15,000-mile guarantee on All-State tires with a new warranty that reads as follows:

"We guarantee Super All-State (or All-State) tires without limitation as to time or mileage. If any tire fails to give you the road service you have a right to expect, we will repair or replace it, charging only for the proportionate wear it has delivered."

The guarantee of Dearborn tires remains at 10,000 miles, and no guarantee is mentioned on the Argosy line. It is expected that Montgomery Ward & Company will issue a similar form of warranty on its Riverside line shortly.

Western Tires Called Cheaper Than Akron's

THAT California can manufacture and ship to the eastern states automobile tires at a lower cost than Akron was recently asserted by A. G. Arnall, former railway engineer and industrialist and now an official of the Los Angeles Chamber of Commerce. His statement was made in connection with the opening of the new Los Angeles factory of the Firestone Tire & Rubber Company.

"Our tire industry is now second only to Akron," declared Mr. Arnall. "We can manufacture tires here owing to water, freight and other favorable conditions and lay them down on the Atlantic seaboard at a lower cost than Akron can, though the factories here are now supplying only 11 far western states.

"The Goodyear and Goodrich factories here started production at 5,000 tires daily. Firestone is starting at 7,500 daily. Samson, our own local concern, is now in the 'big league' and has announced plans for a factory as large as any of the others and will boost production to 7,500 tires a day. Then three of the tire factories will be turning out 7,500 tires each daily, and Goodyear will be on a 12,000 daily basis."

General Tire & Rubber Has Best Year in History

SURPASSING all previous records in the history of the organization, the General Tire & Rubber Company reports net sales for the year ended November 30, 1928, of $26,154,000, bringing in net profits to stockholders of $2,002,000. Because of numerous price declines last year and the heavy loss sustained in participation in the crude rubber pool, the earnings were not so large as the $2,524,325 reported in 1927 and the gain in net sales over the previous year's total of $23,692,500 does not reflect the actual increase of approximately 50 per cent in unit sales.

Net earnings for 1928 amounted to $18.40 a share, and gross earnings, after absorbing inventory losses of more than $1,000,000, amounted to $24.22 a share. An extra cash dividend of $2 on the common stock, paid January 2 to stock of record as of December 10, was recently announced. This extra dividend of 8 per cent, together with an increased dividend from 12 to 16 per cent, makes a total of 24 per cent in dividends on the par value of $25 a share.

Stock outstanding amounts to $3,500,000 in 6 per cent cumulative preferred and $2,037,500 in common shares. During December the price quotations for the common stock of the company advanced from 200 to 283 on the Cleveland exchange in view of the highly satisfactory report for the fiscal year.

"It costs no more now for the best tire than the cheapest tire cost a few years ago," William O'Neil, president of the company, remarked in commenting on the report. "The low price of crude rubber has made the quality tire available to more pocketbooks while the extra power and four-wheel brakes of the modern car have convinced motorists they need a better tire.

"With our manufacturing capacity taxed to the utmost, working three shifts daily, the introduction of a new style

tire, which the company had in preparation for more than a year, was forced to wait until production on the regular six-ply balloons could be increased to take care of the demand. For this reason the new dual balloon "8" which General brought out last fall accounted for but a small part of the year's gain."

Officers and directors of the company were re-elected at the annual meeting on December 27, the only change being the addition of Charles J. Jahant, vice-president of the company, to the board.

Rubber Section, Safety Council, Holds December Meeting in Akron

THE quarterly meeting of the executive committee of the Rubber Section, National Safety Council, was held at Akron on December 18 and 19. The members spent the entire day of the 19th at the plant of the Goodyear Tire & Rubber Company. General discussions of accident prevention methods featured the business sessions,

and the committee adjourned until February when they will meet in Detroit.

Those shown in the photograph are the following: Front row, left to right: Jack Lynch, Fisk; Jack Kidney, George Burns, National Safety Council; Tom G. McKenna, M. A. Quirk, Morgan and Wright. Middle row: L. J. Healy, Federal; R. Kastell, U. S. Rubber; Howard Low, Miller; C. L. Hungerford, Firestone; P. M. Wooden, Mansfield; W. L. Schneider, Goodrich. Back row: G. Durkee, Dave Miller, Stanley Wrobleski, Ed Foran, Ross Allerton, Stanley Mansfield.

Program is Scheduled for Next Akron Group Meeting

THE next meeting of the Akron Rubber Group of the American Chemical Society will be held Monday evening, January 28, with a dinner at the Goodyear Tire & Rubber Company dining hall and a business session in the theatre of the Goodyear Clubhouse. The annual election of officers will be held, and the program will be on the general subject of "The Measurements of Rubber Thickness."

The papers to be read by speakers at the session include "Essentials for Accurate Gauging of Compressible Materials," by R. W. Brown, Firestone Tire & Rubber Company; "Some Practical Methods of Gauging Thickness at Calenders," by E. O. Dietrich, B. F. Goodrich Company; and "Some Causes of Variability of Gauge and Unit Weight of Calendered Products," by R. D. Evans, Goodyear Tire & Rubber Company.

The present officers of the group are H. A. Winkleman, chairman; W. H. Fleming, vice-chairman; and R. J. Bonstein, secretary.

Consider Regina Plant For Goodyear of Canada

THAT Regina is considered as a likely site for a second Canadian Goodyear tire factory was revealed by C. H. Carlisle, president and general manager of the Goodyear Tire & Rubber Company of Canada last month. "When the western demand for automobile tires becomes large enough, we shall establish a factory in the west, and the logical site is Regina," Mr. Carlisle said on a visit to that city with a party of General Motors executives on the occasion of the opening of that company's Regina assembly unit.

"One of the main purposes of my visit," he added, "is to see about extending our building here by two or three stories to provide storage for tires to be used in the General Motors factory, and also to provide for our increasing business in the west."

Rubber Exchange of New York May Open Securities Market

SHOULD plans now in tentative form be adopted, the Rubber Exchange of New York, Inc., may add still another securities market to the world's trading centre, the new mart to be for the purpose of buying and selling shares of rubber producing and manufacturing companies not at present listed on any American exchange. Opening of such a rubber share market would serve to introduce to American investors and stock traders a wholly new line of securities in the issues of plantation companies producing crude rubber in the Far East, the market for which now is on the London Stock Exchange.

In considering this step, the Rubber Exchange is following in the direction taken by the New York Produce Exchange, which recently opened a securities market on its trading floor. The New York Cotton Exchange is said to be planning a similar move, and the Real Estate Board of New York has also announced that it will shortly institute an exchange for the trading of realty issues.

Although there have been a few consolidations of late, the number of British rubber plantation companies whose shares are traded in on the London exchange totals nearly 1,500. The industry is, however, extremely well organized, and full statistics regarding each company are always available. In view of the intricacies which may arrive in dealing with small holdings in a number of widely scattered plantation companies, it is probable that American holding companies may have to be formed before dealings on a New York exchange can be practicable.

Goodyear Makes Clark Dirigible Plant Head

ELMER CLARK, master mechanic of the Goodyear Tire & Rubber Company, has been appointed plant superintendent of the Goodyear-Zeppelin Corporation and will direct construction of the super-dirigibles which are to be built for the United States navy at the Akron municipal airport. He will have charge of the activities of the force of men who will start work on the actual building of the huge airships as soon as the hangar is com-

pleted. It is expected that the hangar will be ready by June and men are now being trained in the Goodyear plant for work on the construction of the dirigibles.

Mr. Clark has been associated with the Goodyear organization since 1905, starting as a machinist and being promoted to machinist foreman in 1913. He has been master mechanic since 1914. Until he completes his work with the Zeppelin corporation, his position as master mechanic will be filled by M. B. Uhrich, who came to Goodyear in 1919 as a civil engineer and was made assistant master mechanic in April, 1928.

Rubber Producing Plant Is Reported in Georgia

AFTER making a 10,000-mile search through half a dozen states, sometimes tramping for days through wooded country, W. A. Benney, superintendent of the botanical laboratory of Thomas A. Edison, has found a prolific plant which the electrical wizard thinks has great possibilities as a source of rubber. The name of the rubber-bearing plant, which was found in the front yard of a Georgia home, has not been revealed, but Mr. Benney says that experiments have shown that it contains a larger percentage of pure rubber latex than any of the thousands of plants with which the inventor has worked. It belongs to the shrub family and grows in abundance in southern states.

About a year ago, Mr. Edison discovered a plant grown in Madagascar which, at that time, he said, looked very promising. Since the finding of the new plant in Georgia, however, it is believed he will concentrate his efforts on the native shrub. Mr. Benney calls the find "remarkable in view of the fact that the plant was for many years thought worthless, except for decorating purposes and yard planting."

Mr. Edison, who has been at his home in Orange, N. J., is expected to arrive at his laboratory at Fort Myers, Fla., on January 14 to resume his experiments.

Goodyear Executives Advanced in New Year Personnel Changes

JOSEPH E. MAYL, formerly manager of truck tire sales for the Goodyear Tire & Rubber Company, has been appointed manager of its southern division. In his new position, he succeeds C. W. Martin, Jr., who has been given a leave of absence.

Mr. Mayl has been with Goodyear since 1925 and has been truck tire sales manager since January, 1928. He was graduated from Dayton College with an A. B. degree in 1906 and, after three more years of study in financial subjects at the University of Pennsylvania, joined the sales department of the Chalmers Motor Company at Detroit. From there he was sent to a branch agency at Richmond, Va., which also handled Firestone tires, and with the knowledge he gained there he was able to join the sales force of the Firestone Tire & Rubber Company with which he worked for 14 years.

E. R. Preston, formerly assistant manager of truck tire sales for Goodyear, will succeed Mr. Mayl as manager of the truck tire department, and K. A. Dalsky has been appointed assistant manager.

R. S. Burdette, formerly of the manufacturers sales department, has been appointed manager of the newly organized rim sales department. Personnel of the new department, which will handle the sales of Goodyear type K rims for trucks and buses, will also include L. T. Beck, another former member of the manufacturers sales department.

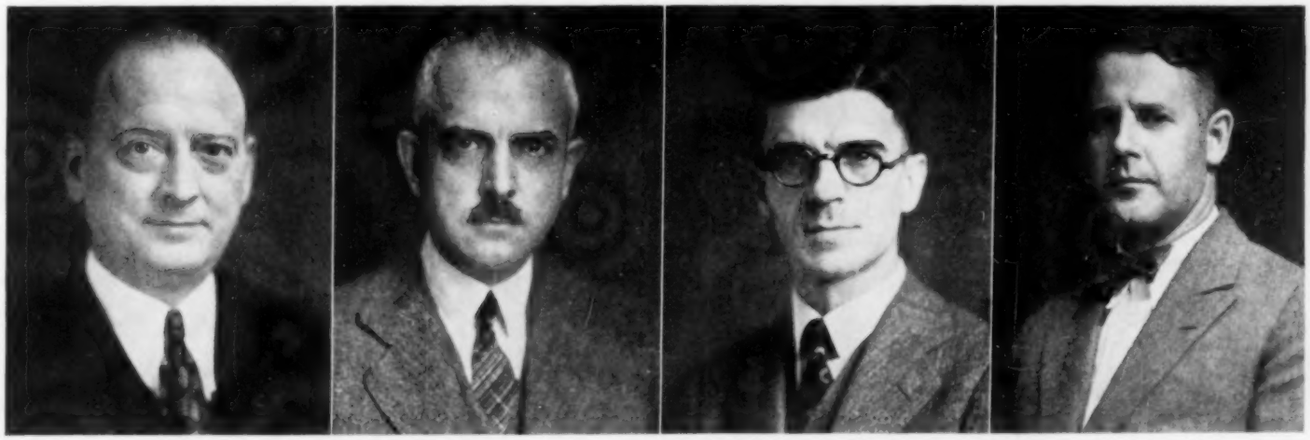
Mr. Burdette started with the Goodyear company in the development department of the factory in 1919 and was transferred to sales work in 1926. Mr. Beck has been in the manufacturers sales department since 1917.

Samson Tire & Rubber to Build $8,000,000 Factory

PLANS for a new factory at Los Angeles to cost approximately $8,000,000 have been announced by the Samson Tire & Rubber Company of that city. The company, which already has plants at Compton and San Diego, Cal., has purchased a 40-acre site on Telegraph Road from the Union Pacific Railway and will erect what will be one of the largest tire factories in the west, according to A. Schleicher, president, employing 2,500 workers and producing 6,000 tires and 10,000 tubes daily.

Building work on the new plant is scheduled to start January 15, and it is expected that the structure, which will be of massive Babylonian architecture, will be ready for occupancy and operation by the latter part of the year. Practically all machinery needed for the factory has been ordered, more than 100 carloads of equipment having already been specified. The addition of the new factory will enable Samson to operate with a tire and tube capacity equal to, if not larger, than that of either of the three branch plants which Akron companies are now maintaining in Southern California.

A few weeks ago the Samson organization was reported as having purchased a tract of 250 acres on the Almeda Boulevard, Los Angeles, immediately south of the new factory of the Firestone Tire & Rubber Company.



J. E. MAYL R. S. BURDETTE L. T. BECK E. R. PRESTON

Akron Rubber Reclaiming Opens Its Western Plant

UNDER the name of the Midwest Rubber Reclaiming Company, the Akron Rubber Reclaiming Company opened its new plant at East St. Louis, Ill., on January 1. The new factory is located on a 20-acre site, and its estimated output is about 7,500 tons a year.

The company which will operate the plant was organized last spring with an authorized capital of 24,000 shares of preferred and 60,000 shares of common stock, the majority of the latter being owned by the Akron Rubber Reclaiming Company. William M. Welch, first vice-president and general manager of the Akron organization, will act as president of the new company.

WILLIAM WELCH

Mr. Welch has been connected with the rubber industry since 1916, at which time he became associated with the Goodyear Tire & Rubber Company. He was in charge of reclaimed rubber sales in that organization when, in 1923, he resigned and organized the Akron Rubber Reclaiming Company in connection with C. E. Bishop, who had previously been superintendent of Goodyear's reclaiming division.

The other officers of the new company are S. G. Luther, vice-president and general manager, and W. A. Hart, secretary and treasurer. It will continue to be closely allied with the parent company at Akron in all its general operations.

The present building of the plant is 90 by 500 feet in size and was constructed at an original investment of approximately $1,000,000, all the equipment and machinery being new and of the most up-to-date design. Because of the large tract acquired by the firm, it will be possible for expansions to be made as they may be needed.

Mr. Welch believes that the rubber reclaiming business has a firm and prosperous future. In summarizing the achievements of the Akron company with particular reference to its new expansion, he says, "From the start we have adhered to the policy that reclaimed rubber was not a material used to cheapen rubber products. On the contrary, we are firm in the conviction that reclaim is a specific compounding ingredient, which, when satisfactorily manufactured and scientifically used, in no way impairs the quality of the finished rubber product. In many cases such products made from large percentages of reclaimed rubber are superior to those manufactured without it. The volume of reclaimed which will be used depends largely upon the reclaimer himself. Crude rubber, carbon black, sulphur, accelerators, and all sorts of inert fillers and pigments are sold to rigid specifications. Reclaimed rubber, which is a combination of these materials, can be advantageously substituted only when it is produced to equally close specifications."

Boston Rubber Symposium To Be Held on January 12

THE 233rd meeting of the Northeastern Section, American Chemical Society, will be in the form of a joint meeting with the Boston Rubber Group at the University Club, Trinity Place, Boston, Mass., during the afternoon and evening of January 12. A program of broad interest will start with an afternoon session at 3 o'clock, followed by a dinner at 6 P. M., and the evening session at 7:45.

The Boston Group of the Rubber Division, A. C. S., was organized early last year with the purpose of affording the opportunity for sectional meetings for those interested in rubber chemistry and technology. It is the present policy to hold two or more yearly meetings such as the coming session at which speakers prominent in the rubber industry will present the latest developments in research, processing and methods.

A campaign is now being carried on to enlist as many members in the Boston Rubber Group as possible, and all interested in rubber technology are invited to become members. Any member of the American Chemical Society may become a member of Boston Group Rubber Division by paying $3 annually and receive the quarterly publication, "Rubber Chemistry and Technology." Those who are not members of the American Chemical Society may receive the year's subscription and become members of the local group upon payment of $5 yearly. Those who do not require the publication may become members of the Boston Rubber Group by paying the regular annual dues of $1.

It is important that reservations be made at once for the rubber symposium in connection with the Northeastern Section, A. C. S., as it is anticipated that the University Club facilities will be taxed to capacity. Reservations, accompanied by checks for $2, the price of the dinner ticket, should be sent immediately to T. M. Knowland, secretary and treasurer of the group, at the Hood Rubber Company, Watertown, Mass. Student members may secure dinner tickets at $1.50 each by notifying Ernest H. Huntress, Massachusetts Institute of Technology, Cambridge, Mass.

The detailed program for the sessions of the rubber symposium is given below.

Program of the Boston Rubber Symposium

University Club

Saturday, January 12, 3 P. M.

1. Dr. A. A. Somerville (R. T. Vanderbilt Company). *Some New Laboratory Work on Rubber Compounding.*
2. T. M. Knowland (Hood Rubber Company). *Tire Design with Relation to Comfort, Flexibility and Wear.*
3. W. B. Wiegand (Binney & Smith Company). *Deduction of Rubber Stress Strain Determinations.*

6 P. M.

Northeastern Section and Boston Rubber Group Dinner

7:45 P. M.

4. Dr. E. R. Bridgwater (E. I. du Pont de Nemours & Company). *Anti-Softeners and Fatigue Inhibition.*
5. Dr. Sidney M. Cadwell (United States Rubber Company). *Anti-Oxidants.*

F. R. HENDERSON

P. W. LITCHFIELD

F. B. PETERSON

Leaders of the Rubber Industry See 1929 a Year of Prosperity

More Confidence Than in 20 Years

By F. R. HENDERSON

President, Rubber Exchange of New York, Inc.

Probably at no time in the last twenty-five years has the rubber industry looked forward with more confidence to a new year than at present.

Consider that twenty years ago the total production of rubber, wild and plantation, amounted to less than 70,000 tons. In 1928 the world will have consumed nearly 700,000 tons. Then you will better understand the enormous growth of the industry. What the rubber tire manufacturer has accomplished has largely contributed to the growth of the automobile industry.

After the deflation of 1921 the rubber industry was undergoing a period of readjustment when the Stevenson law was suddenly enacted, controlling the output of the crude material in an area that dominated the world's supply at that time.

It was almost impossible for the manufacturer in this country to base his selling-price on his rubber costs with any degree of certainty. Supplies were withheld in the British East to a point where prices were forced up.

This could be only partially passed on to the public or ultimate consumer, but when declines took place there was no way of avoiding serious losses on the stocks on hand. On November 1, 1928, the British restriction law was rescinded, and for the first time in six years the crude rubber market can now find its economic level. Knowledge of conditions in producing and consuming markets can be given consideration and study which, of course, has been impossible under Government regulation.

It is interesting to note that the world stock of rubber at the end of 1928 is approximately the same as at the end of 1927. The price level a year ago was approximately 40 cents per pound, whereas today's price level, around 20 cents, gives the manufacturing industry an opportunity for a healthy start in 1929.

The Rubber Exchange is constantly growing in its usefulness to various branches of the industry. Manufacturers can obtain price insurance for their future needs and at the same time protect excessive holding in the face of a declining market on their raw material.

Perhaps the volume of business on the Rubber Exchanged during the year is the best indication of its growth. Total transactions involved over 400,000 tons, or about the same amount as the country's consumption.

The automobile industry has become so thoroughly organized that estimates of an increase of 20 per cent in new car manufacture for next year do not seem unreasonable. Even the most skeptical are now realizing the important part motor transportation is playing in the industrial development and consequent prosperity of the country. Today there is almost a unanimity of opinion that general prosperity will remain with us for at least another two years.

So, with rubber an integral part of our everyday life, one is justified in looking at the new year with a full measure of optimism.

Market in Natural Condition

By FRED B. PETERSON

of Fred B. Peterson & Company

With the end of 1928 the crude rubber markets of the world are found in a more natural condition than has been the case since 1922, when the Stevenson restriction plan, sponsored and controlled by the British Government, was put in operation. The outstanding feature of the year was the removal of these restrictions. Admittedly uneconomic, its removal had long been urged by some of the far-seeing factors in the British rubber growing industry. Had it not been removed, rubber would by this writing in all prob-

ability be selling at more than twice its present price, which is approximately 18 cents per pound at New York.

In the field of reclaimed rubber the percentage of increase is not as large as is the case in the consumption of crude rubber. In 1927 there were 182,000 tons of reclaimed used in this country, against an estimate of 207,000 tons for 1928. Figures are issued on a percentage basis, and so it will be impossible to place the exact tonnage until late January or February.

Various forecasts of the world consumption of rubber for the year 1929 have been made. It appears to be rather generally agreed that consumption will total in the neighborhood of 710,000 to 720,000 tons, although these figures must necessarily be arrived at in an arbitrary way.

Other statisticians set world production at approximately the same figure.

There is considerable disagreement as to the probable increase in consumption in the United States. The argument is brought forward that tires are higher in quality than ever before and that they will last longer. On the other hand, with good business conditions predicted for 1929, the new equipment business should increase materially in volume. In any event, should consumption equal receipts of rubber in the United States in 1929, it is entirely reasonable to presume that rubber will be selling quite a bit higher than it is at present.

For the immediate future there are several unusual conditions which must be given serious consideration. During the period of restriction stocks were accumulated in the Far East and it has been extremely difficult to estimate the tonnage. Since the actual removal of restrictions on November 1, shipments from the primary markets have been the largest in the history of the rubber industry. During the month of November about 70,000 tons of crude rubber were loaded at ports in the Far East for shipment to the United States. In addition, during the last weeks of December, London stocks have been on the increase for the first time in several months. Also, shipments afloat to other countries must be taken into consideration.

Arrivals at United States ports in January, 1929, promise to be the largest on record. February will probably show equally large arrivals. These facts have very naturally been anticipated, as the price of rubber clearly shows. The course of the market over the next three months is highly problematical, but it is likely that the large arrivals will have a depressing effect on the market, temporarily, at least; to what extent will depend on the rapidity with which they are absorbed. For the most part importers are optimistic concerning the coming year, but the crude rubber market will undoubtedly be in a healthier condition after it is definitely known how well the factories will take up the rubber arriving here in the coming three months.

That there will be a temporary surplus is admitted, but it is felt that there will be sufficient demand from the factories to take up the surplus over a moderate period of time.

The only artificial factor apparent in the market at present is the so-called "pool." Its effects on the market is not as noticeable as in times past. At present prices its existence is not a matter of great moment to the industry as a whole.

During the first half of the year the Rubber Exchange of New York, Inc., was used extensively by the importers and to a certain extent by firms in London, on the continent and in the primary markets. Over the last half of the year, due to the lack of sizeable fluctuations the volume of business fell off considerably. Nearing the end of its third year it has definitely proven its value and on a more active market will without a doubt be the scene of heavy trading.

Industry Never on Sounder Ground

By WILLIAM O'NEIL

President, General Tire & Rubber Company

I would not be surprised if the rubber industry were to establish new records in both production and sales during the coming year. The industry was never on sounder ground than now. Steady growth of the tire industry, plus increased demand from overseas markets and a generally prosperous era, should insure a good year for the rubber industry. The industry, in the first place, will feel this year the pull of increased replacement business in tires for the new high-powered automobiles that went into service last year and the year before, particularly those cars whose speed, braking equipment and weight were increased at the expense of tires.

Unfavorable influences, such as recent abrupt price declines, which have affected the industry unfavorably, have been removed. There will be a normal supply of rubber procurable at prices perhaps slightly higher than at present, due to the fact that rubber is now selling below production cost.

American rubber factories will be doing business in a healthy, rising market, despite the fact that consumers will enjoy the benefits of high-grade tires at low prices.

Inventories of finished goods are generally satisfactory in the rubber industry. Credits, which have been below par, should show better. While thousands more tires were made and sold in 1928, neither profits nor dollars and cents showing of various companies were in harmony with gains made, due to the rubber drop and consequent low tire prices. Inventory write-offs, which followed the crash of the rubber market in 1928, wiped out the first six months' profits for most rubber companies.

Despite obstacles encountered during the year, the industry as a whole approached the new year in good financial condition and in an optimistic frame of mind. General Tire & Rubber Co., with a gain in unit sales of 50 per cent and profits above $2,000,000 confidently expects to go beyond 1928 business in 1929.

The industry is perhaps more happily situated than for several years and I do not believe any of us have a full appreciation of accomplishments possible in the coming year.

Situation Makes for Stability

By P. W. LITCHFIELD

President, Goodyear Tire & Rubber Company

The profits in the rubber tire industry have been more affected by the fluctuations in the price of crude rubber than by any other condition. On account of the long time it takes to produce crude rubber (six to ten years) when a shortage is manifest, and also the difficulty of checking the supply without the highly capitalized plantations going back to jungle when a surplus has been developed, it is subject to considerable variation in price, as affected by the law of supply and demand. At the present time crude rubber is selling at a reasonable or low price, based on its cost of production, and supply and demand are substantially in balance. Such a situation makes for stability, and should result in satisfactory and normal profits in 1929.

Goodyear is just closing the greatest year in its history, as regards volume of production and sales.

We have confidence of a continuation of good times in the United States well into next year and continued increase in the use of automobiles in nearly all countries. On this account, we are adding to all of our existing factories, and building a new factory in the new industrial South.

A Simple Tread Cracking Test

Description of a Device Used by the Lee Tire and Rubber Company in Testing Cracking Resistance of Tire Treads

By A. H. NELLEN,

Chief Chemist, Lee Tire and Rubber Co., Conshohocken, Penna.

WITH the advent of the new types of balloon tires with thicker treads and deeper designs, it is generally agreed that tread cracking or splitting is more apt to become a cause of complaint and failure than has been the case with the standard type of high pressure and balloon tires. Therefore, in the development of the design and construction of these "super" tires, as well as in the compounding of tread stocks for them, the problem of prevention of cracking is of considerable importance.

Laboratory flexing machines of various types have been employed to measure the resistance of rubber compounds to cracking, but up to present no test has been described which will show the relative cracking tendencies of different tread designs. Moreover, there is some evidence to indicate that the relative ability of any two tread compounds to resist cracking may depend upon the design and contour of the tread, and for that reason it is highly important that comparative tests between different compounds be conducted on the tire for which the compounds are to be used.

With these facts in mind, we have designed a simple device which may be used either for studying the cracking tendencies of tread designs or the effect of various compound changes upon the resistance to tread cracking.

Design of Machine

The accompanying photographs show the essential features of the cracking test machine that is used in our laboratory. Figure 1 shows a front view, and Figure 2, the oblique rear view. The crown of the pulleys may be varied by padding them with friction tape at the desired points. The lower left-hand pulley (Figure 1) is belt driven at a speed corresponding to a surface speed of the tire at thirty miles per hour. The right center pulley is hinged and held against the tire by a fifty pound weight. The details of the hinge and method of application of the tension may be seen in Figure 2.

Method of Conducting Test

The tire to be tested is made in the usual manner, after which the beads and sidewalls are cut off. The tread is not removed from the carcass. If the tendency of various compounds to crack is being investigated, the tire is built with a half and half tread, or in some cases with three tread stocks, the dividing lines between the various stocks being marked by colored gum in the usual manner. When it is desired to compare the relative cracking tendency of different tread designs, a mold having one design on half of the tire and the other on the opposite half is made and the test tire cured in that mold.

The tests conducted in our laboratory have been made on a wide range of passenger car sizes as the machine can be adapted to the different sizes by changing the position of the lower right hand pulley which is bolted in a slot and is movable over a range of ten inches.

The tire with the sidewalls and beads removed is run

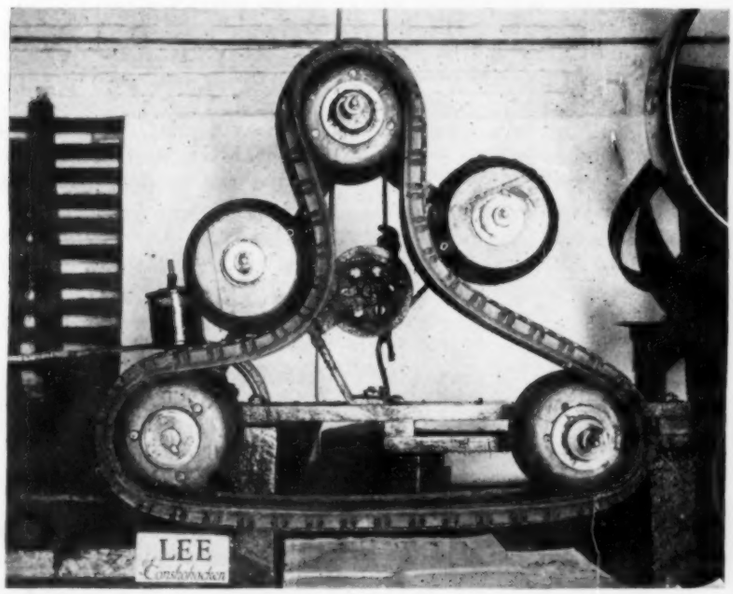


Figure 1—Front View of the Tread Cracking Test Machine

Figure 2—Oblique Rear View

as a belt on this machine until cracks have developed in one section of the tire. The time required varies considerably, depending upon the tread design and resistance to cracking of the compounds that are used. Each portion of the design is flexed three times during each revolution, and as more distortion is produced at each flexure than the tire will get in ordinary service, it is evident that the mileage obtained on the machine is equivalent to a very much higher amount of normal running.

Effect of Tread Design

Experience to date with this machine appears to indicate that the tread designs that have the least tendency to crack are those in which the rubber in the grooves, or between the design members, is subjected to the least tension when the tire is inflated. We believe that compression of tread rubber does not cause cracking, but that this is due to the repeated application of tensile stresses.

A study of the relative distances between various portions of the tread design before and after inflation will indicate the location of the maximum strain in the design, and the point at which cracking is most apt to occur can be predicted with accuracy.

Preventatives of Cracking

Perhaps the most important information that has been developed through the use of this machine is that concerning the effect of various compounding ingredients on the flexing resistance of tread stocks. It has been found that there are some chemicals which improve the flexing resistance of compounds very markedly. Many of the most effective preventatives of tread cracking are also strong antioxidants. On the other hand, all antioxidants are not effective in preventing this type of deterioration of the rubber, and there is reason to believe that the effectiveness of a chemical in preventing tread cracking is not related to its antioxidant effect.

(EDITOR'S NOTE: In a covering letter the author states that those interested in further information concerning this device, or in acquiring one of the machines, should communicate with the Lee Tire & Rubber Company, Conshohocken, Pa.)

Edison Talks on Rubber

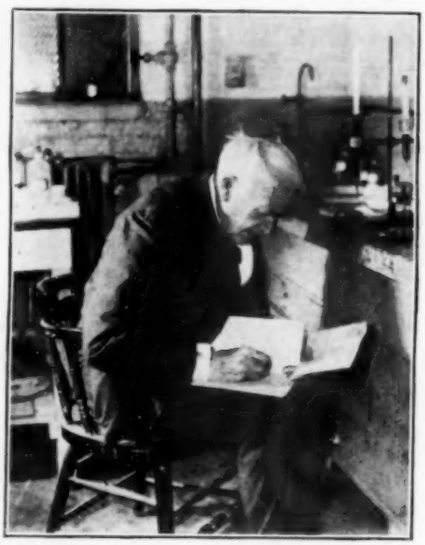
IN a recent interview with Samuel Crowther published in "The Saturday Evening Post" of January 5, Thomas A. Edison gives the following interesting account of the progress he has made in his investigations with rubber producing plants and his plans for the future development on a large scale of a domestic supply of rubber sufficient to safeguard the industry in times of national emergency.)

"ONE of our weaknesses is our lack of certain essential raw materials in the case of war. The most important of these is rubber. We must have rubber. We cannot get along without automotive machinery, and that will rack itself to pieces unless it be protected by a cushion of rubber. Germany found that out during the war. If we went to war one of the first and most logical steps of the enemy would be to cut off our rubber supply. We could not possibly protect the long lanes of supply reaching halfway around the world.

"I have been working in connection with Henry Ford and Harvey Firestone to discover some home source for a rubber supply. There is no money in this for any of us. I do not see any prospect of producing rubber within the United States at any figure which can compete with the supplies from the East Indies, Africa or South America. That is not the object of our work. I want to find a rubber supply that we can turn to in the emergency of war, for then cost will not matter. Or, to put it another way, we can afford to pay high prices. That is why I started my investigation, although I will admit that I like chemistry and liked the opportunity to get away from machinery.

"Up to date I have examined fifteen thousand plants, trees and shrubs growing within the United States to discover their possibilities as rubber producers. This line of investigation has never before been undertaken, and I may say that the patience of Job has been considerably overrated. He did not know what patience was. Each of those plants has had to go through a long process of analysis to determine the rubber content and quality and I have discovered over twelve hundred wild plants, each different from the other, which contain appreciable amounts of rubber. By no means all of them grow in the Southern States —one of the best grows as far north as the Yukon. I have found that the ordinary mangrove bush, which grows almost everywhere around the southern seas, has a great deal of rubber.

"The work ahead involves finding what plants, shrubs or trees will yield the most rubber. Then we shall work on developing their rubber content by budding and other means. Then we shall have to learn how to harvest them and how to manufacture the rubber into commercial form. Finally, when the work has gone far enough, we shall establish one model factory and farms, scattered over the country will supply plants. When this unit is a success, with proper agricultural machinery, we will make a standard specification with detailed drawings, so that an unlimited number of units could be instantly started in the factories of the country should war appear.



"I do not know when this work will end. But already I know enough to be certain that eventually we can have our own emergency rubber supply and can never be defeated for the lack of rubber."

Flex

THE R. T. Vanderbilt Company, New York, has just announced a new brand of Thermatomic carbon called Flex. The original Thermatomic is now known as Thermax. Flex is a soft carbon made from gas; having a specific gravity of 1.75 and is slightly darker than Thermax. It is said that large amounts can easily be mixed into rubber and that it makes a soft stock in either the cured or uncured state and that it improves mixes containing reclaimed rubber.

According to its manufacturers Flex produces high tensiles, big elongation and a low modulus or stiffening effect. It hastens rather than retards the cure. It is not like carbon black and is shaped uncompressed in bags.

Rubber Association Holds Annual Election and Banquet

F. A. Seiberling Named President for Ensuing Year—Woolner and Newhall Elected Vice-Presidents—Increased Budget and Reports of Officers Approved in Short Business Session—Banquet Is Great Success

THE annual meeting of the Rubber Association of America, Inc., was held at the Commodore Hotel, New York City, January 7, at which time a distinct departure was made in the election of officers for the ensuing year, through the naming of F. A. Seiberling, president of the Seiberling Tire & Rubber Company, to head the Association, succeeding P. W. Litchfield, president of the Goodyear Tire & Rubber Company, who had been appointed at the last annual meeting. Heretofore it had been customary for presidents of the Association to hold office for two consecutive terms and to be succeeded by the previously elected first vice-president. Precedent, however, was followed in this case in so far as Mr. Seiberling has been first vice-president of the Association since the last election of officers.

The business meeting was one of the shortest ever held in the history of the Association, lasting only 22 minutes and was attended by less than 75 representatives. Only routine business was transacted and the printed reports of the secretary and general manager and the treasurer of the Association, which had been previously distributed, were unanimously approved as published. The report of the budget committee, which was also approved, carried an increase in the appropriation for the coming year and totaled $262,000 as against expenditures for the year ending December 31, 1928, of $212,513.90. The assessment to members to cover expenses of the ensuing year was set at 2¾ cents per hundred pounds of rubber consumed. This assessment is at the same rate as approved the year previous.

The report of the treasurer was given in full detail and contained several new items which were largely responsible for the increase in this year's expenditures, chief among which was the items for crude rubber investigations in the Middle East and the educational work with dealers towards the care of tires.

The assets of the Association as of December 31, 1928, totaled $243,173.76, while the liabilities amounted to $247,340.70, showing a total loss for the year in operating expense of $4,166.94.

New directors, who were elected to serve three years, were as follows: G. B. Dryden, president Dryden Rubber Company; E. B. Germain, president Dunlop Tire & Rubber Corporation; A. B. Newhall, vice-president Hood Rubber Company; William O'Neil, president General Tire & Rubber Company; J. D. Tew, president The B. F. Goodrich Company. E. S. Boyer, president of the American Hard Rubber Company, was elected as a director to serve two years, and C. D. Garretson was named as a director to serve one year. All the nominations were unanimous and the election of the list was made by the casting of one vote of the general manager and secretary, A. L. Viles.

Immediately upon the close of the business session, the board of directors held a separate meeting for the election of officers, resulting in the selection named below. The outstanding feature in the election this year was the division of the title of general manager and secretary into two separate offices. A. L. Viles was re-elected to serve as general manager while A. D. Kunze, who has been with the Association for many years, was elected secretary.

(Continued on following page)

F. A. Seiberling Newly Elected President of The Rubber Association of America, Inc.

No new business was discussed at the general meeting although several matters, including the question arising out of the proposed tariff revision of the Federal Government, was referred to the board of directors for such action as they deemed fit. After a few general extemporaneous remarks by Mr. Litchfield, the meeting was adjourned.

The general session of the Association and the meeting of the board of directors was immediately followed by a luncheon.

The annual banquet, which traditionally follows on the evening of the annual meeting of the Association and which this year celebrated the twenty-ninth anniversary of the organization, was held in the grand ballroom of the same hotel at 7:30 p. m. Aside from an excellent and well served dinner, the occasion was unique in that it marked a decided departure in the way of after-dinner entertainment from the usual speeches scheduled by prominent public men, which has been the order of the day at previous banquets. The program this year was made up entirely of musical and other theatrical entertainment of the highest order, including several numbers by Giovanni Martinelli, the well-known tenor of the Metropolitan Opera Company, and the famous comedy team of Weber and Fields. Music was supplied by the Temple Orchestra. Other performers included seven dancers under the personal direction of Albertina Rasch, as well as Daisy Jean, the Vernon Trio, Kilbourn Gordon, Carl Randall and Virginia Watson, Harry Foster Welch and George MacFarlane.

The guests assembled in the foyer and went into the main dining-room promptly at 7:30. Music by the orchestra continued throughout the dinner and the evening's entertainment began with a few general remarks of welcome from P. L. Litchfield, the retiring president of the Association, shortly after coffee and cigars had been served.

OFFICERS OF THE RUBBER ASSOCIATION OF AMERICA, INC., 1929

President .....F. A. Seiberling, Seiberling Rubber Company.
1st Vice-President...Samuel Woolner, Jr., Kelly-Springfield Tire Company.
2nd Vice-President..A. B. Newhall, Hood Rubber Company.
General Manager ..A. L. Viles.
Secretary .....A. D. Kunze.
Treasurer .....W. O. Cutter, U. S. Rubber Company.

Rubber Company Stock Issues Close High

WITH the deflation and promised stabilization of crude rubber prices following the end of the Stevenson Act restrictions, the stock issues of the leading tire and rubber companies have soared to new peaks in the final trading days of 1928. Despite record losses sustained by many companies in the first six months of the year after writing off inventory losses on rubber that had been purchased at high prices, the high production and sales rate of the second half of 1928 resulted in a remarkable recovery for the industry. The rise of rubber company shares during December was the outstanding feature of the principal stock exchanges.

Goodyear Tire & Rubber Company common was the most active issue, going from 101 on December 17 to an all time peak of 140 and later receding to 128. The floating supply of Goodyear common has been greatly reduced by accumulation by important Akron and New York interests, causing it to soar, and offerings have been well taken on all minor setbacks. Predictions that Goodyear will show earnings of better than $7 a share for 1928 and in excess of $16 a share for 1929 have attracted a considerable outside following. The preferred stock also reached a new high of 105, but dropped back to 103¾.

Goodrich common was almost equally active last month, rising from 85 on December 17 to a new high of 109¼ and receding to 101 in the final days of the period. The greatest actual advance was made by the common shares of the General Tire & Rubber Company, which moved forward from 215 to a record peak of 283 upon news of the year's statement of profits in excess of $2,000,000. Firestone soared from 197¾ to a peak of 259, but later dropped back 25 points. Seiberling and Kelly-Springfield preferred were others that attained new highs for 1928 in the final trading days.

The closing prices on December 17 and January 4 and the high and low quotations for 1928 of the principal rubber company issues are listed on Page 386 of this issue.

Basic Causes of Accidents in Factories

ONE of the members of the Rubber Division of the National Safety Council reports the following information as a result of 6 months experience with accident cause classification as set up by Mr. H. W. Reinrich of The Travelers Insurance Company. A well laid plan of discipline in rubber factories, coupled with efficient supervision of the workers, is urged as the most effective method of combating such a situation.

Number of accidents—2,668, classified as follows:

Disobedience of instructions	3½%
Unsafe short cuts—improper practice	11
Inattention	37
Inexperience, lack of skill	15
Fatigue	1
Poor housekeeping—congestion	1½
No safety apparel or improper apparel	1
Lack of proper equipment	3
Defects in tools, equipment or materials	8
Occupational	17
Miscellaneous	2
Total	100%

"Lexide"

THE comparatively recent substitute leather product of the U. S. Rubber Company, to be known under the name of "Lexide" is being used successfully in book bindings. It is only being produced in limited quantities at the present time and distributed through only two concerns, one of which is the du Pont organization.

Vanderbilt Testing Laboratory

New Building Nearing Completion—Equipped With Most Modern Testing Machinery and Appliances—Laboratory To Be Used for Control Tests and Research Work

WHAT is expected to be the most modern and completely equipped rubber testing laboratory maintained by any manufacturer of rubber chemicals and compounding materials will throw its doors open shortly at East Norwalk, Conn., just one hour out from New York on the main line of the New York, New Haven and Hartford Railroad. This laboratory is owned by the R. T. Vanderbilt Company, New York City, and will be operated by the firm's own staff of engineers and chemists.

The main uses of the laboratory will be for running control tests on Vanderbilt materials as well as doing research work on various compounding problems and the effect of anti-oxidants in oils—a development which is being pioneered by this firm.

The building is of brick construction, 3 stories high, about 50 x 75 feet in size and fireproof throughout. Construction work has been completed and equipment is being installed now. The front of the building faces a paved highway while the rear faces the railroad. The site on which the laboratory is built consists of a two-acre plot which will be suitably graded and planted in the Spring so that it will present an attractive appearance.

A feature of the building seldom found in similar laboratories is the inclusion of two private bedrooms with lavatories and baths on the third floor for the use of laboratory workers who may be engaged on problems necessitating overnight work.

The ground floor is principally used for power and heat purposes, the second floor for physical testing and the third floor for chemical testing. Adjacent to the main building is a separate room used for making tests in the Bierer-Davis Oxygen Bomb. This room is seen on the left in the photograph on this page showing the front view of the laboratory building.

The power and heat equipment includes two oil heated boilers, a low pressure boiler for heating purposes and a high pressure one for furnishing steam to the vulcanizers and presses. On this floor is also included a black room containing a 60′ standard Farrel mill for mixing blacks, breaking down rubber and making master batches. A stock room and 6-car garage is also provided on this floor.

Front View of the New Laboratory

On the next floor is a spacious compound room, the physical testing laboratory and a special room insulated for temperature and humidity control with refrigerating and humidifying equipment. The equipment of the physical testing room includes laboratory size mills and calenders, vacuum dryer, presses, hot air vulcanizers and a laboratory Banbury mixer, of which only two others are in existence in laboratories in this country. The platen presses are the latest electrically operated type, the platens being raised or lowered by motors instead of the usual hydraulic ram. The testing equipment includes Scott tensile testers, flexing and abrasion machines. The Scott testers are equipped with hot and cold water tanks for testing at high and low temperatures. The flexing machine is also equipped with heating and cooling devices.

On the third floor is a well equipped chemical laboratory and an electrical test room with high voltages available for work on the effect of anti-oxidants in oils.

Rear View Showing the Two-Story Elevation. This Fronts a Railroad Siding

RUBBER CHEMISTRY and Technology

The Mechanism of the Reinforcement of Rubber by Pigments*

By HARLAN A. DEPEW

New Jersey Zinc Company, Palmerton, Pa.

Abstract

Dispersed pigment reinforces by increasing the tear resistance. Flocculated pigment hardens rubber and reinforces by increasing the resistance to cutting. It may also increase the tear resistance, but not to as great an extent as if the pigment were well wet.

The mechanism of the reinforcement by increasing tear resistance is that the pigment particles act as obstacles that cause the tear to proceed in a longer path going around the particles. Due to the round-about path, the component of the force in the direction of the tear may be small. Accordingly, it is possible in the case of a fine pigment to increase the tear resistance even though the rubber-pigment bond is much weaker than the rubber itself.

The hardness of a stock containing flocculated pigment is due to the rigidity of the structure assumed by the flocculated pigment.

During the early moments of hot vulcanization, rubber is semi-fluid and the degree of dispersion may be largely determined during this period; some of the pigments becoming dispersed and some becoming flocculated.

Flocculated pigment and large particles introduce uneven stresses during the straining of rubber that lower the reinforcement below what might be expected.

ABRASION resistance is one measure of the reinforcing power of a pigment in rubber. In a recent paper[1] it was shown that this reinforcement was the resultant of resistance to cutting due to hardness and of resistance to tear. That paper did not discuss how pigments gave tear resistance and hardness to rubber and this paper considers that side of the problem and presents the idea that flocculated pigment is responsible for hardening a stock and that a dispersed pigment gives tear resistance.

Pigments may exist in rubber as:

1. Unmixed soft pellets
2. Agglomerates
3. Dispersed particles
4. Flocculated particles

Unmixed pigment consists of small pellets that have been carried into the interior of the rubber during mixing as a group and which roll around in a little pocket in the rubber and incorporate very slowly.

Agglomerates consist of a number of particles that are held together by a cementing material so that they will not break up during mixing in rubber or during vulcanization. They may be considered as large individual particles.

Unmixed and agglomerated pigments obviously have no reinforcing value in rubber. They cause weakness similar to that caused by porosity. It should be mentioned that a poorly wetted pigment may mix poorly and consequently a larger percentage of it is likely to be unmixed than if it be well wetted.

It is unusual to find large amounts of unmixed and agglomerated pigment in rubber. If the pigment is wet by the rubber, it will be pretty evenly distributed throughout the mass of the rubber and will be found dispersed to such an extent that every particle will be separated from every other particle. If the pigment is not well wet by the rubber, and if the particle size is small, the particles will be somewhat flocculated instead of being completely dispersed, for in the absence of wetting, the forces of flocculation tend to exceed the force of dispersion.

This paper is intended to present the idea, as has been stated, that flocculated pigment reinforces by increasing the hardness of the stock and that dispersed pigment increases the reinforcing properties by increasing the resistance to tear.

Taking up flocculation first, the method by which it hardens a rubber compound is analogous to the stiffness shown by the kerosene-zinc oxide paste in the well known experiment, illustrated in Figures Nos. 1 to 5, that F. P. Ingalls[2] demonstrated privately nearly ten years ago.

(NOTE: This experiment was demonstrated before the Rubber Division by Frank Breyer at the Pittsburgh meeting of the American Chemical Society in the Fall of 1922.)

In this experiment, a pile of zinc oxide was rubbed down with kerosene until it became a smooth plastic mass that could be molded into various shapes. A drop of highly viscous blown poppy seed oil or a small flake of solid stearic acid was rubbed in, and the once plastic mass thinned down and became as fluid as water.

Microscopic examination before and after the poppy seed oil[3] had been added showed that the zinc oxide in the plastic material was highly flocculated; the particles were in groups, like bunches of grapes (to quote F. G. Breyer) whereas after the poppy seed oil had been added each particle was separate and in Brownian motion.

Whether a pigment exists in a flocculated condition or in Brownian motion depends on the degree that the pigment is wet by the vehicle. If the pigment is sufficiently well wet there will be no flocculation and the individual particles will be seen to be dancing across the field of the microscope.

Coarse pigments are not seriously flocculated in rubber due to the relatively small flocculating force. As the particle size of a pigment becomes less, the tendency to flocculate increases; the amount depending on the degree that the pigment is wet by the rubber. If the fine particle sizes of a pigment stiffen a "compound," the material is poorly wet and the pigment is flocculated. If they do not harden it, the pigment is dispersed and the material of which it is composed is easily wet. Zinc oxide is an example of a material that is wet relatively better by rubber than most other materials.

The poor wetting of most materials by rubber is shown by the fact that in the finely divided form they tend to stiffen the rubber in which they are compounded. Microscopic observation shows the flocculation. It gives a hazy mottled appearance to a micro-section. The opaque spots frequently seen are unmixed pigment or agglomerates rather than flocculated pigment.

Since most of the fine size pigments reinforce rubber and make hard stocks, and since hardness has been shown to be a factor in reinforcement, it is reasonable to conclude that flocculation is

(*) Paper presented at meeting of Rubber Division, A. C. S., Swampscott, Mass., Sept. 11-13, 1928.

[1] Depew—Proceedings of the A. S. T. M. for 1928.

[2] John W. Masury & Son.

[3] Journal of Industrial & Engineering Chemistry, Volume 15, No. 2, P. 122 (February, 1923).

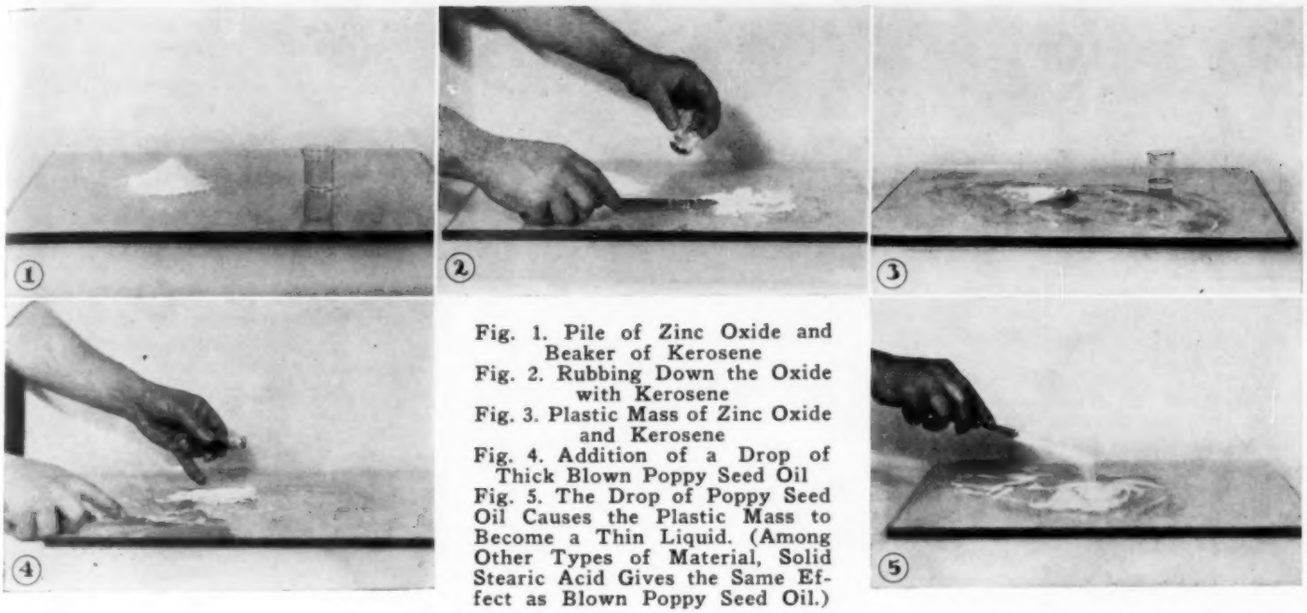


Fig. 1. Pile of Zinc Oxide and Beaker of Kerosene
Fig. 2. Rubbing Down the Oxide with Kerosene
Fig. 3. Plastic Mass of Zinc Oxide and Kerosene
Fig. 4. Addition of a Drop of Thick Blown Poppy Seed Oil
Fig. 5. The Drop of Poppy Seed Oil Causes the Plastic Mass to Become a Thin Liquid. (Among Other Types of Material, Solid Stearic Acid Gives the Same Effect as Blown Poppy Seed Oil.)

responsible, at least in part, for the reinforcing properties of a poorly wet pigment.

A hardening effect in rubber, the same as caused by flocculation, occurs whenever a number of pigment particles get as close together as they do through flocculation, irrespective of how they come to be so close together. It may be actual flocculation, it may be heavy pigment loading, it may be some condition of mixing, or it may be a combination of these possibilities.

The mechanism of hardening due to flocculation is well recognized from the work on yield value of paints[3]. The "rough structure" developed by the flocculates resists deformation, due to the "frictional" forces developed when the pigment particles are forced to rub over one another during stressing.

For the second phase of the problem which consists in explaining how pigments give tear resistance to rubber, refer to zinc oxide. It is to be expected this pigment would be relatively well wet when we consider the chemical reactivity between it and the organic acids in the rubber, and it is proven by microscopic observation and through the data in Figure No. 6 that brings out the well known fact that the hardness of vulcanized zinc oxide stocks containing a fine pigment with a particle size of 0.15 of a micron is not greatly different from that of stocks containing zinc oxide with a particle size of 0.3 of a micron. Zinc oxide must be remarkably well wet by rubber for no flocculation to show up over this large range of particle size.

The question may arise as to why zinc oxide is not in Brownian motion in the rubber if it is well wet and the answer is that at room temperature, the rubber is too viscous for this to occur.

At ordinary vulcanizing temperatures (40 pounds steam—141½°C.), however, there is a moment in the early part of the heat treatment when the rubber may be very fluid and it is during this moment that some of the poorly mixed pigment becomes better wet and more perfectly distributed. If dispersed the pigment is in Brownian movement at this moment and if poorly wet it becomes flocculated; the organic acid in the rubber playing an important part in bringing about the degree of wetting of reactive pigments.

The wetting of pigment by rubber will change during milling, during vulcanization, and during cooling as the interfacial tension of the rubber and pigment changes. The pigments are probably all less wet in vulcanized rubber than they were when the rubber was more fluid during the early stages of vulcanization.

Schippel[4] has demonstrated the relatively superior wetting of zinc oxide by vulcanized rubber through the experiments in which he showed that the force of adhesion between rubber and zinc oxide was greater than that between rubber and any of the other pigments that he investigated.

The curves in Figure No. 6 show that the abrasion resistance and the tear resistance (Goodrich test using peanut shaped test piece) given by zinc oxide increase rapidly with decreasing particle size. (The tensile strength increases similarly but to a less degree.) Since reinforcement is the resultant of cutting and tearing resistance and since a well dispersed pigment does not increase the hardness or cutting resistance, it follows that the effect of a well dispersed pigment in rubber must be to increase the tear resistance of the stock.

The increased tear resistance given to rubber by well dispersed pigment may be explained by assuming that the particles are obstacles in the path of the tear and that they prevent a straight tear. The tear has to travel a much longer distance in going around the particles, and the change in the direction of the tear will frequently be such that the component of the tearing force in the direction of the tear will not be most effective. The "path of the tear" in rubber containing dispersed and flocculated pigment is visualized in Figures Nos. 7a and 7b.

(NOTE: Tensile tests are largely tearing tests but if the test piece is sufficiently small[5], the test is a cohesion test and the tensile strength is very great.)

If the force of adhesion of the rubber to the pigment particle is greater than the cohesion of the rubber, the tear will proceed through the rubber going around the pigment at some distance and increase the tear resistance, whereas if the force between the pigment particle and the rubber is less, the tear will take place at the pigment surface and whether or not the pigment will lower or increase the resistance to tear will depend on whether the increase in length and change in direction of the tear is large enough to compensate for the lower force necessary to separate the rubber from the pigment.

It is quite possible that the bond between rubber and pigment is not sufficiently strong even in the case of zinc oxide to cause separation to take place through the rubber rather than at the interface.

A pigment may give a considerable increase in tear resistance as well as in hardness, and it is probable, although not essential, that in this case only part of the particles are much better wet than others and that the force of adhesion between the rubber and each particle will vary accordingly.

Green[6] has enabled us to see this difference in wetting properties by microphotographs of stretched rubber containing Barytes; the rubber has pulled away from some of the particles but not from others (this is shown better in the original photograph than in the reproductions). The poorly wet particles of Barytes are dispersed because the particle size is too large for flocculation to become a very great factor.

In the case of a fine pigment that is wet to a variable degree,

[4]Journal of Industrial & Engineering Chemistry, Volume 12, No. 1, Page 33, January, 1920.

[5]Griffith Phil. Trans. Roy. Soc. London A-221, 163-98, (1920).

[6]Journal of Industrial & Engineering Chemistry, Volume 13, No. 11, Page 1029, November, 1921.

part of the reinforcement will accordingly be in the nature of hardness and part will be tearing resistance.

Although flocculated pigment reinforces because it is flocculated, the reinforcement is of the hardness type and it frequently happens that the compounder wishes the pigment to reinforce by increasing the tearing resistance. It is easy to say, "Add a dispersing agent," but this is not easy to do. If we repeat the zinc oxide and kerosene experiment, substituting carbon black and kerosene we do not get

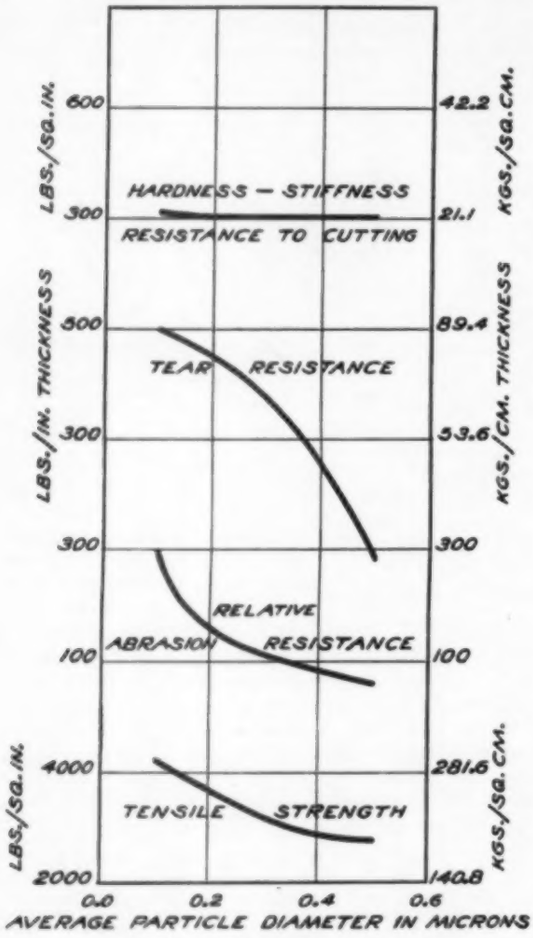


Figure 6
The Difference of Particle Size on the Rubber Making Properties of Zinc Oxide

dispersion on adding stearic acid or blown poppy seed oil. And in the case of rubber, we do not increase the dispersion by adding stearic acid and medium pine tar oil to a carbon black stock as shown by the curves in Figure No. 8.

(NOTE: Since the preparation of this paper, Goodwin[7] & Park have published a paper in which they also report that neither stearic acid nor zinc stearate improve the dispersion of carbon black in petrol or rubber.)

The hardness of the black stock changes much the same with the addition of softener as the control stock without black and the tear resistance of the black stock, relative to the control, does not increase as it would if the softener had increased the force of adhesion between the black and the rubber. There may be materials that will wet carbon black in rubber better than the rubber itself, but stearic acid and medium pine tar oil failed.

(NOTE: The data given in Figure No. 8 was obtained from tests on the following tread compound approved by Sub-Committee XIV of D-11 of the A. S. T. M.)

Rubber (a)	1,000
D. O. T. G.	12½
Sulfur	35
XX Red Zinc Oxide	182
Carbon Black	400
Softener (b)	40-(0-160)

(a)—Pale Crepe and Smoked Sheet 50:50.
(b)—Double Pressed Stearic Acid and Medium Pine Tar Oil 50:50.
(400 parts of carbon black to 1,000 parts of rubber by weight calculates as 21 volumes of pigment to 100 volumes of rubber.)

A practical compounder will ask, "Then what does stearic acid do?" and he will point out that the gloss of a freshly cut carbon black stock increases as the stearic acid content increases and that the little pimples of unmixed pigment become less conspicuous. A number of these stocks have been examined carefully by microscope methods with this thought in view and it appears that the softer rubber compound has worked into the pimples of unmixed carbon black and broke them up into a number of smaller pimples that are less conspicuous. Possibly some of the unmixed black has actually become mixed but it remains poorly wet and will be largely flocculated.

Fig. No. 7a
A two dimensional representation of the path of a tear through rubber containing dispersed pigment

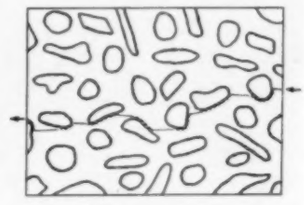


Fig. No. 7b
A two dimensional representation of the path of a tear through rubber containing flocculated pigment. The rubber separates easily from the pigment at the interface due to the poor wetting.

***Note*: Non-homogeneity of the rubber may cause the tear to become more irregular than shown above**

Stearic acid may also improve the rubber compound by making the accelerators more effective through its chemical activity during vulcanization.

The opposite to starting with a flocculated pigment and dispersing it, is to start with a dispersed pigment and to add something that will flocculate it and thereby increase the hardness. A rubber stock containing zinc oxide can be hardened by the addition of hydrated lime which probably reacts with the organic acids present in the rubber and thereby removes them as effective dispersing agents. A lowered wetting can probably also be brought about by the addition of certain organic materials. It is probable that

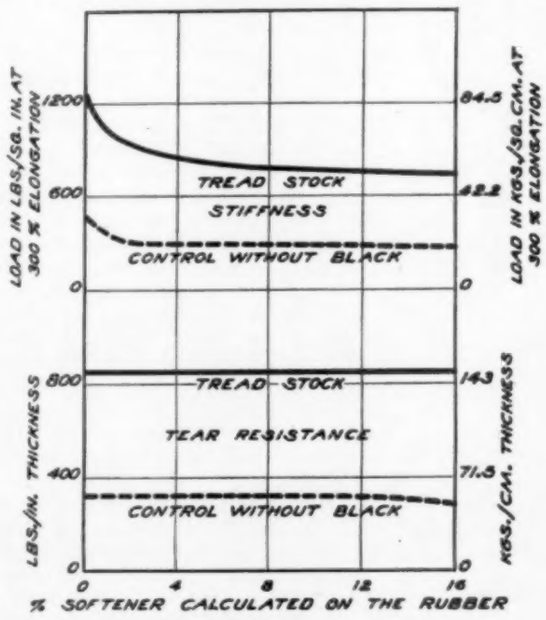


Figure 8
The Effect of Softeners on the Hardness and Tear Resistance of Tread Compound

[7]Journal of Industrial & Engineering Chemistry, Volume 20, No. 6, Page 621 (June, 1928); No. 7, Page 766 (July, 1928).

the degree of wetting of individual particles, first dispersed and then flocculated, will be very uniform.

At first thought one might conclude that much higher pigment loadings would be practical than experiment has shown to be a fact since increased pigment concentration apparently increases both the hardness and the tear resistance up to the amount of pigment that can be mixed in the rubber. The trouble with this idea is that if a compound is too heavily loaded, the stresses will not be distributed evenly throughout the rubber and accordingly the unions at one pigment-rubber interlace after another will have to carry too large a part of the stress and they will rapidly fail in sequence much the same as a rope fails when strand after strand breaks.

An attempt is being made to investigate the strains around pigment particles with a polarizing microscope.

It is practical to use much higher volume loadings with dispersed pigment than with flocculated pigment. This is the reason that a fine particle size zinc oxide (.15 microns) stock containing from fifty to sixty volumes of pigment to one hundred volumee of rubber will give a greater area under the stress strain curve than any other commercial pigment, although it is not the smallest in particle size.

The non-uniformity in stress exists even around small pigment particles and is accentuated in the case of large particles, causing lower reinforcement than would be expected on the basis of the explanation given for the mechanism of pigment reinforcement if the condition of stress were neglected.

The mechanism of pigment reinforcement has been considered from the viewpoint of abrasion resistance in this paper but the idea could have been developed from a study of tensile tests. Flocculated pigment gives rigidity to rubber, stiffening the stress-strain curve, and dispersed pigment increases the length of the stress-strain curve since the tensile test is in part a tearing test.

At present many of the thoughts expressed are qualitative but as new and better testing methods are developed, they can be expressed in a more quantitative form. A better understanding of tear tests, of hardness tests, of pigment wetting, and of the distribution of stress in a rubber test piece will all be steps in the right direction.

Auto Accessories Business Shows Big Year

MANUFACTURERS of automotive parts, accessories and repair equipment are closing their greatest year with production and sales at high levels and will open 1929 with virtual assurance that during this year, 1928 records will be surpassed, according to the Motor and Equipment Association, which is composed of approximately eight hundred manufacturers and wholesalers of automotive products.

With a production of approximately 5,000,000 motor cars and trucks looked for next year, suppliers of units and parts to the car manufacturers and replacements and accessories to the trade will have to maintain operating schedules at extremely high levels to take care of this increased demand.

During this year manufacturers of units and parts for original equipment of motor cars have had their greatest year because of the increased vehicle output. Service parts manufacturers have also shown a consistent increase throughout the year and are expected to continue this gain because of heavier car registrations and more improved highways, which means greater demand for replacements.

Sales to the Aircraft Industry

SALES opportunities in the aircraft industry for manufacturers and wholesalers, including rubber goods, are indicated in a preliminary survey made under the auspices of the Motor and Accessory Manufacturers Association, which, with the Automotive Equipment Association, has been merged into the new Motor and Equipment Association. The survey summarizes aircraft registrations, airport locations, sources of supply for aircraft manufacturers, operators and service stations; shop equipment commonly used and parts, accessories and supplies most frequently in demand at the flying fields. Experiences of automotive wholesalers in supplying the aircraft market in their vicinities are also summarized.

The survey also contains definite suggestions to manufacturers and wholesalers for development of aircraft business.

Rubber Consumption in 1927

THE Bureau of the Census has just released the statistics covering consumption of crude rubber and reclaimed rubber in the United States, during 1927, by manufacturers classified by that Bureau in the "rubber industries." Only those firms, the major value of whose products are rubber goods, are classified under the rubber industry, hence the statistics are incomplete, not covering consumption of rubber and reclaimed rubber by manufacturers of electrical goods, insulating wires, asbestos packings, golf balls, and certain other products not classified under the "rubber industries." The crude rubber consumption is reported for the leading items of manufacture for the first time.

The total consumption of crude rubber by 400 reporting establishments classified under the rubber industries, during 1927, was 364,017 tons, and the total consumption of reclaimed rubber was 175,760 long tons, the ratio of reclaimed rubber to crude rubber being 48.3 per cent. The consumption of crude rubber by-products is reported as follows:

United States Crude Rubber Consumption by Products, 1927

Products	*Long Tons*
Automobile casings	231,505
Automobile inner tubes	52,009
All other casings and inner tubes	1,177
All solid and cushion tires and tiring	15,724
Tire sundries and repair materials	4,830
(A) Total tire products	305,245
Rubber boots and shoes	17,164
Rubber heels and soles	6,690
Rubber-proofed fabrics and clothing	5,355
Rubber belting	3,821
Rubber hose and tubing	4,885
All other mechanical rubber goods	5,387
Rubber flooring and rubber mats and matting	1,713
Hard rubber goods	1,485
Rubber thread	2,781
Rubber cement	1,482
Druggists' and medical rubber sundries	2,022
Rubber toys	1,407
All other manufacturers of rubber	4,580
(B) Total other rubber goods	58,772
GRAND TOTAL, all products	364,017

The Rubber Association of America reported consumption under (A) above for 1927 as 291,186 tons and under (B) as 51,540 tons. The Rubber Association of America rubber consumption statistics for tires were therefore 95.4 per cent complete; for other products, the indicated degree of completeness compared with the incomplete figures reported by the Census Bureau was 88 per cent. The Census figure for rubber consumption under (A) may be taken as 100 per cent complete.

It should be noted that the manufacturers of rubber toys and rubber cement were included under the "rubber industries" by the Census Bureau for the first time in 1927; in 1925, the consumption of rubber by these firms was not included in the officially reported consumption of 387,629 long tons.

The Rubber Division of the Department of Commerce is now securing statistics of 1927 consumption of crude rubber and reclaimed rubber by establishments not classified under the "rubber industries" by the Bureau of the Census, and a report giving the results of this survey will be made available at the earliest possible date.

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EDITORIAL COMMENT

The Squaring Off Period

A NOTED economist, speaking before an assembly of business executives about this time several years ago, pointed out that it was impossible to predict accurately the trend of business for the coming year at this time because the complete figures for the previous year were not yet available, and because January was normally a quiet period of business, giving no indication of the future.

"In my judgment," he said, "what happens in the first six months depends very largely upon the amount of patience we have in the first six weeks of 1928. The first six weeks of any year is the natural vacation time for business men of the United States, and if they would learn to take vacations at that time instead of in the summer and not try to boost business in January and February, that would be a great thing for business in the United States. I advise letting business go along by itself during the first six weeks. About the 15th of February, when the ground begins to warm up, is the time to start things—when they ought to start."

This statement is particularly applicable to the rubber industry. January is the time when the automobile manufacturers are tuning up for the big run, the motoring season is at its lowest ebb, and the demand for tires is only in a formulating stage. Footwear manufacturers are cleaning out their winter stocks and preparing for summer production. The fall and winter business does not reach production until March or April. Mechanical and proofing trades experience a quiet period before things start to pick up.

There is no good reason, therefore, for the annually expressed hope for better things in 1929 to be dashed to earth because the mills are not running overtime the first week of the New Year.

The Warranty vs. the "Guarantees"

WHEN the newly formed Rubber Institute, Inc., drew up its pneumatic tire warranty last August and broadcast its provisions to the car owning public of the country, it took a definite step toward the establishment of a new order of better merchandising practices in the rubber industry. The announcement of the new warranty and the subsequent definition of its terms were received with universal acclaim not only by tire manufacturers and dealers, but by the motorists who are the consumers of our tire production.

Since that introduction of the Institute's policy, the majority of the country's manufacturers who are members of the organization have held firmly to the course outlined so unmistakably in that succinct statement:

> **"Every pneumatic tire of our manufacture bearing our name and serial number is warranted by us against defects in material and workmanship during the life of the tire to the extent that if any tire fails because of such defect, we will either repair the tire or make a reasonable allowance on the purchase of a new tire."**

There have been other companies, however, which have not adhered to the Institute warranty. Chief among these have been the large Chicago mail order houses who distribute millions of special brand tires each year. But now has come the good news that these mail order companies have eliminated the long definite mileage guarantees which they previously offered and with the exception of their cheaper lines of tires, they now offer only the standard Institute warranty.

This leaves only a relatively small number of tire manufacturers who, while subscribing to the Institute policy, still feel the necessity of offering some special guarantee to purchasers of their tires. True, these are usually not definite mileage guarantees, but they are frequently no less onerous in their sweeping provisions.

As long as the mail order houses were harassing the tire dealers of the country with definite mileage guarantees it was perhaps natural for various manufacturers to want to give their dealers some selling appeal in addition to the standard Institute warranty. But now that the mail order houses have made the move which was regarded some time ago as extremely unlikely, the problem of achieving a really standard and accepted warranty is put squarely up to the tire manufacturers. It is to be hoped that individually and through the Institute they will work for the abolition of special guarantees instead of continuing to extend the unfortunate practice.

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SHORT NEWS & DEPARTMENTS

Names in the News
Rubber Goods & Specialties
Foreign Rubber News
Crude Rubber Items

PHARIS RUBBER COMPANY PLANS PLANT EXPANSION

The Pharis Tire & Rubber Company, Newark, O., has started work on the erection of a new brick building, 100 by 90 feet in size and of a type similar to others now used as units of the present plant. This structure will be completed within 45 days and with the installation of new machinery already purchased will permit the production of approximately 5,000 tires and up to 10,000 inner tubes daily.

The Pharis company has been running on a production schedule of better than 3,000 tires daily for the past year, and the new expansion has been made necessary by increased business from old accounts and the addition of new dealers.

The company has recently been doing intensive tire testing of its own and other makes of casings. A test fleet has been working 24 hours a day, and C. W. Grigsby, who has driven 250,000 miles in the past two years for the company, recently returned from a trip from Newark, O., to Los Angeles, Cal. Every type of road was encountered in the 18 driving days required for the trip, and the car was used at various points by Pharis dealers for publicity purposes.

NORTHERN TIRE COMPANY HAS SALES CONFERENCES

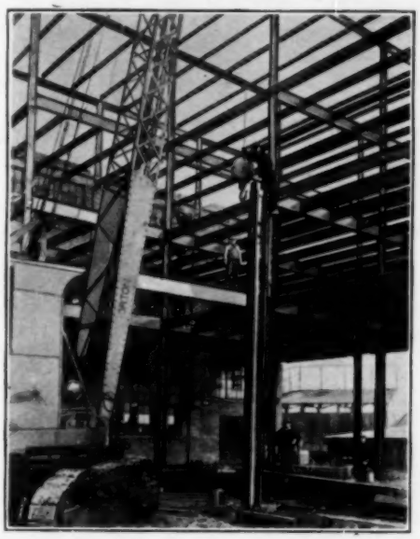
The annual conference of Northern Rubber Company sales representatives in the northern and northeastern territories was held at the plant at Barberton, O., on December 26. The 1929 program of the company was outlined, and plans regarding the manufacture of the Northern Luxor tire were discussed. This marks a new development in tire making, involving an alloy rubber tread, and has been in progress for five years, according to officials of the company.

Speakers at the conference included L. J. Scott, president of the company; Edmund Shaw, treasurer; George Lies, advertising representative at Cleveland; and R. Olin, factory chemist. A sales meeting for southern and southwestern representatives was conducted during the first week of January.

Gillette Building Contract

The Gillette Rubber Company, Eau Claire, Wis., has awarded to the Hoeppner-Bartlett Company of that city the contract for erecting two new plant additions, each one and two-story, 135 by 80 feet and 50 by 135 feet in size. The first will be used for general production and the other building for expansion in the mixing department. The new structures are estimated to cost in excess of $220,000, including equipment.

General Building is Rushed



A view of the structural steel work on one of the large units for the new $1,000,000 factory addition of the General Tire & Rubber Company at Akron. Speed records were broken recently when this steel work was completed in eight working days as a part of the policy of rushing these buildings to completion so as to provide for a 50 per cent increase in General production as soon as possible.

BARR RUBBER COMPANY OPENS IN NEW FACTORY

The first of the year found the Barr Rubber Products Company in its new plant at Sandusky, O., with 200 workers employed. The company had been closed down since September 6 when its former plant was destroyed by fire, but it is now operating in what was formerly the Dauch tractor factory.

The most recent installation at the new plant consisted of three 12,000-gallon capacity tanks in which to store naptha. These have been set up outside the main building to eliminate fire hazards. The offices of the Barr company were also moved to the new factory from the temporary quarters that had been occupied since September.

"The outlook for rubber products is very good now," said Nelt Barr, president of the company, on the opening of the new plant. "The company has already sold most of the products that will be manufactured between now and early spring."

$20,000 DAMAGE BY FIRE IN FIRESTONE ACID SHOP

A blaze that started in a rubber drying oven in the acid plant of the Firestone Tire & Rubber Company, Akron, O., on December 26 burned out the entire interior of the one-story building and threatened for a time to spread to the main factory of the company. The damage to the acid plant was estimated at $20,000, the building, which had been used for reclaiming and chemical mixing, being completely destroyed.

Flames were shooting from the roof of the acid plant in such volume that six city fire companies responded to the general alarm and aided the factory fire company in battling the blaze for 40 minutes before it was extinguished. Piles of tires stored outside the acid plant caught fire and made a spectacular blaze into which firemen poured a dozen streams of water.

JAIL TERMS AND FINES FOR SCHRADER IMITATORS

Three defendants accused of counterfeiting a patented tire gauge manufactured by A. Schrader's Sons, Inc., Brooklyn, N. Y., were sentenced to one year in the federal penitentiary at Leavenworth and fined $3,000 each by Judge Walter C. Lindley of the United States District Court at Chicago on December 22. This marks the first precedent for criminal action against patent violators.

Previously there has never been a case in which criminal prosecution has been obtained in a federal court against patent violation. Hitherto, the only legal recourse against patent violators has been civil action to recover damages.

Dealers Visit General

About 50 of the largest General Tire & Rubber Company distributors located from Texas to Massachusetts were in conference at the Akron factory during the week of December 18. Sales and advertising policies were talked over, the meetings being handled by William O'Neil, president of the company; S. S. Poor, sales manager; A. B. Stiller, advertising manager; and Ben Herr, assistant advertising manager.

Samson Increases Output

Production at the San Diego, Cal., plant of the Samson Tire & Rubber Company reached a maximum of 1,800 tires daily on December 20, it was announced by B. S. Brown, general manager. The company has a larger plant at Compton, Cal., and is about to construct an $8,000,000 factory at Los Angeles with an output of 6,000 tires daily.

MASON TIRE & RUBBER FACTORY WILL BE SOLD

The Portage County common pleas court has set January 17 as the date for a master's sale of the assets of the Mason Tire & Rubber Company, and, according to present arrangements, it is understood that the bondholders will purchase the plants at the sale and resume operations in February. The Bedford, O., plant has been appraised at $80,000 and the Kent, O., property and plants at $520,000, making a total appraised value of $600,000 for all the factories, inventories, patent, trade marks, and accounts outstanding.

In the case of J. B. Reikerof against the Mason company, Judge C. B. Newton rendered a decision that the present company be dissolved. He ruled that by failing to pay the franchise the company forfeited its corporate rights and he charged that the company at present is unable to operate at a profit. Reikerof was the owner of five shares of the company's stock, amounting to $121.50.

P. W. Eigner, president of the Kent National Bank, who was appointed as receiver several weeks ago, was ordered to convert the assets of the company into cash and to dispose of the company's property not covered by mortgages, in order to pay its creditors. His original bond of $100,000 was not increased. The bonded indebtedness of the company is estimated at $1,900,000.

Footwear Prices Cut

With the publication of the new footwear price list of the United States Rubber Company on January 1, the long expected price reduction in rubber footwear materialized, the average cut being from 5 to 7 per cent. Other companies, including Firestone, Hood, Converse and Goodrich, followed suit, and the sales forces are again out among the trade booking forward business.

Women's cuff gaiters were reduced from $1.60 to $1.45 per pair; men's light rubbers from $1.00 to 95 cents; women's light rubbers from 70c to 67c;; men's first quality short boots from $3.40 to $3.15; men's six-eye pacs from $3.00 to $2.90, and other numbers in similar proportion.

Footwear Plants Shut Down

The complete lack of snow in any part of the country at Christmas time and the anticipated cut in prices January 1, caused a slackening of footwear demand so that many plants closed down until the situation improved; others shifted their schedules from winter to summer goods earlier than usual. All of the factories in the U. S. system closed down over the holidays for inventory; Converse closed from January 1st to 14th, Cambridge is closed down on everything but tennis.

CATALPO!

Returns to America

Hayden W. Shively, arriving at New York City with Mrs. Shively on the "President Harding" after spending three and a half years in Singapore as eastern buying representative of the Goodyear Tire & Rubber Company.

Firm Changes Name

The Cosmic Color Company, 878 Mount Prospect avenue, Newark, N. J., has changed its corporate name to the Contex Color Company. The personnel, organization and policy of the organization remain the same as heretofore. L. D. Walker is president of the company and S. H. Salomon vice-president.

Roovers Brothers Expand

Roovers Brothers, Inc., Brooklyn, N. Y., manufacturers of tools, dies, and metal embossing presses used by tire factories, have issued 40,000 new shares of 7 per cent cumulative preferred stock. The total capitalization of the company is now $600,000, comprised of 60,000 shares of preferred and 60,000 shares of common stock.

Late Stock Prices

	Last Price		1928	
	Jan. 4	Dec. 17	High	Low
Ajax	10	9⅛	14⅜	7½
Falls	7	6½	13	4½
Faultless	30	31	39¾	30
Firestone	234	197¾	259	165
do. 6% pfd.	110	110½	112	109
Fisk	15⅞	13½	17¾	8⅞
do. 1st pfd.	66	64½	91½	55¾
General	279	215	283	165
do. pfd.	100	99	111	98
Goodrich	101	85	109¼	68½
do. pfd.	113½	111	115⅝	109½
Goodyear Com.	128	101	140	45¼
do. pr. pfd.	103¾	101½	105	92½
Hood	26	25½	43	25
India	42	35	57¾	21
Intercontinental	11	10¾	21⅜	8⅛
Kelly Springfield	22½	20¾	25½	19¼
do. 1st pfd.	98¾	—	101	58
Lee	22⅝	20	26¼	17¼
Miller	23½	22⅜	27	18⅞
do. pfd.	79	73	97½	70
Mohawk	65½	55	246	29¾
do. pfd.	—	88	95	55
Norwalk	5¼	5⅝	7½	2½
do. pfd.	—	—	48	33¾
Seiberling	63	51½	67¾	33½
do. pfd.	107¾	107	107½	102
U. S. Rubber	46⅝	41	63¼	27
do. pfd.	85¼	72½	109¾	55

New Manhattan Dividend

The directors of the Manhattan Rubber Manufacturing Company, Passaic, N. J., have declared a dividend of 75 cents a share, payable January 31 to all stockholders of record as of January 15. This is at the rate of $3 per share instead of $2.50 per share, as has been paid in recent years, and represents an increase of 20 per cent. The company also distributed a bonus to its employes on December 20, amounting to 2 per cent of the employes' annual salaries.

Cleveland Equipment Auction

The rubber, textile and metal working machinery and equipment of the Cleveland Equipment & Engineering Company, Cleveland, O., were sold at a public bankrupt auction on the firm's premises at 6308 Kinsman Road on January 3. W. A. McCoy acted as auctioneer, and Sterling Parks, Jr., was the receiver for the company.

Horace L. Williamson

Horace L. Williamson, assistant manager of mechanical goods sales for the United States Rubber Company, fell from a window of his apartment on the tenth floor of 161 West 54th Street, New York City, on the morning of January 5 and was killed instantly. Mr. Williamson was 65 years old and had been appointed to the position he held at the time of his death in December, 1924, after he had been with the United States Rubber Company several years.

Henry Munger

Henry Munger, sole owner of Moore & Munger, 33 Rector Street, New York City, producers of Catalpo, died of pneumonia on January 5 at Muhlenberg Hospital, Plainfield, N. J. Mr. Munger, who was 64 years old at the time of his death, was a member of the board of governors of the Muhlenberg Hospital, a member of the Plainfield Country Club, and other organizations.

Funeral services were held from his residence, 1441 Prospect Avenue, Plainfield, on January 7. His father, Horace Raymond Munger, and one sister, Miss Jessie Munger, survive.

Walter Bennett

Walter Bennett, manager of the Akron district of the General Tire & Rubber Company, died on the morning of December 26 in his thirty-sixth year after an illness of less than a week with pneumonia. Mr. Bennett was taken ill at the Portage Hotel, where he made his Akron headquarters, but was removed later to his home in Zanesville, O.

Formerly connected with the C. N. Walsh Company, Cuyahoga Falls, O., he joined the General organization seven years ago in the auditing department. Early in 1928 he was placed in charge of the Akron district of the company, which includes Ohio, Indiana, Michigan, West Virginia, Kentucky and western New York.

Mr. Bennett leaves his widow and three sons. Funeral services and burial were at Zanesville.

Names in the News

W. F. VIEH, of the India Tire & Rubber Company, is scheduled to speak on March 20 before a meeting of the Cleveland Chapter of the National Association of Cost Accountants. His topic will be, "Some Problems in the Rubber Industry."

R. H. EAGLES, sales manager of the rubber department of J. M. Huber, Inc., New York City, recently left on a month's trip to the western coast where he will call on the rubber trade and also visit the company's representatives in Los Angeles and San Francisco. Mr. Eagles is expected to return to New York City about January 28.

GEORGE D. KRATZ resigned his position as president of the Falls Rubber Company, Cuyahoga Falls, O., last month. Mr. Kratz, who became president of the Falls organization only a year ago, is credited with being the first man in the rubber industry to develop the preparation and use of diphenyl-

GEORGE D. KRATZ

guanidine, popularly known as DPG. He made his first connection with the rubber industry in 1912 with the Diamond Rubber Company and later went to the Norwalk Tire & Rubber Company, Norwalk, Conn., but returned to Ohio in 1917 to join the Falls Rubber Company, where he was successively chief chemist, plant superintendent, sales manager, vice-president and president.

W. F. EARLS, formerly advertising manager, general division, of the United States Rubber Company, and with the firm for 13 years, has been promoted to general manager of advertising. In his new position, he will be in charge of tire advertising as well as of the general division.

P. W. LEAVITT, Goodrich historian, completed his forty-eighth year in the employ of the B. F. Goodrich Company at Akron on December 29. He joined the Goodrich organization when it was only ten years old and is believed to be the oldest employe, in point of service, in the rubber industry.

BRUCE BEDFORD, president of the Luzerne Rubber Company, Trenton, N. J., spent the Christmas holidays with his family at Wilkes-Barre, Pa.

O. MOYNIHAN L. D. McCONNELL

OWEN MOYNIHAN, for the past five years secretary and general sales manager of the Northern Rubber Company, has been appointed general sales manager of the Monarch Rubber Company, Hartville, O. L. D. MCCONNELL, formerly general manager of the Spreckles-Savage Tire & Rubber Company, San Diego, Cal., has also become associated with the Monarch organization, which is about to manufacture tires under its own brand name instead of specializing in the production of tires for other concerns as heretofore. Mr. McConnell, an Akron man, began his career with the Goodyear Tire & Rubber Company in 1910 before going to the Pacific coast.

H. B. NEWMAN, formerly connected with the Holcombe Rubber Company, New York City, as production manager and plant engineer, has joined the United Rubber Machinery Exchange, Newark, N. J., as consulting engineer and sales representative.

ROBERT MATHIAS, wholesale dealer in rubber goods at 14 Bleeker Street, Newark, N. J., has purchased a new site on Academy Street in that city for the purpose of establishing a warehouse and retail store.

ROBERT LEE, general sales manager of the Thermoid Rubber Company, Trenton, N. J., recently returned from an extensive business trip through Europe. He inspected the various distributing points from which Thermoid brake lining and other products are sold throughout Great Britain and the Continent.

SIR GEORGE BEHARRELL, managing director of the Dunlop Rubber Company, Ltd., and president of the Society of Manufacturers and Traders, returned to England on the Majestic. He had spent three months visiting the United States, Canada, and Japan in connection with the properties of the Dunlop organization.

L. D. TOMPKINS, president of the General Rubber Company, has been made vice-president of the United States Rubber Company, in charge of all tire activities. H. GORDON SMITH, assistant to the president, tire division, has been made a second vice-president.

DR. W. H. MCMASTER, president of Mount Union College, was the speaker before the employes' night meeting of the Goodyear Tire & Rubber Company at Akron on December 29. This marked Dr. McMaster's fifth appearance before Goodyear employes on occasions of the same nature.

WADE T. VAN ORMAN, well known balloonist, spoke before the Falls Kiwanis Club of Cuyahoga Falls, O., on December 18. He described the national balloon race last May in which he was injured and his companion killed and discussed the construction of the new giant Navy dirigibles by the Goodyear-Zeppelin Corporation.

DR. H. A. WINKLEMAN of the Philadelphia Rubber Works Company addressed a meeting of the Chemistry Club of Akron University on December 22.

M. H. TISNE, manager of manufacturers' accessories sales for A. Schrader's Son, Inc., has been elected president of the Cycle Trades of America, Inc., the organization

M. H. TISNE

of the bicycle and motorcycle manufacturers of the United States. Mr. Tisne, a Fordham University graduate, has been connected with the Schrader organization for 20 years.

J. R. HOLLINGSWORTH has joined the Textile Rubber Company, Medina, O., in the capacity of factory manager. Mr. Hollingsworth, a graduate of the Alabama Polytechnic Institute, has had 15 years of experience in experimental and production work with hard rubber products and is well known for his work in connection with the new all hard rubber steering wheel.

HARVEY S. FIRESTONE, president of the Firestone Tire & Rubber Company, and FRANK A. SEIBERLING, president of the Seiberling Rubber Company, had an extended conference at Toledo, O., last month with JOHN N. WILLYS, president of the Willys-Overland Company. While it was said that the conference was of a business nature, no details were revealed.

C. H. CARLISLE, president of the Goodyear Tire & Rubber Company of Canada, and president of the Goodyear Cotton Company of St. Hyacinthe, Quebec, has been elected a director of the Dominion Bank of Canada.

Rubber News Around the World

LARGE ATTENDANCE AT LONDON RUBBER FAIR

Princess Louise, Duchess of Argyll, Opens Christmas Exhibition of All Varieties of Rubber Products at the English Capital.

WITH large crowds in attendance on the five days during which it was opened, the Rubber Fair conducted at the New Horticultural Hall, London, was a complete success. Princess Louise, Duchess of Argyll, formally opened the exhibition, which was held just prior to the Christmas shopping period.

The Rubber Growers' Association had a prominent exhibit, which included articles to be given by the association to hospitals and similar institutions. Visitors to the fair were given the opportunity to add to these gifts. An attractive "children's corner" was provided with a display of rubber toys, some of which were used in the decoration of two large Christmas trees. There were also many trade exhibits, which showed the resources of the rubber industry in the production of articles of household equipment, domestic use, garments and games, and prominence was given as well to the industrial side of the industry, including an exhibit of rubber road paving. A block taken from the stretch of rubber road paving in New Bridge street, London, over which 32,000,000 tons of traffic have passed during the last two years, was shown in comparison with a new rubber paving block.

Rubber Roadway Exhibit

Several yards of rubber roadway were laid in the hall itself, as well as a rubber tennis court. The exhibits included rubber-upholstered aimchairs, bowls and vases, shaving brushes, a soap-holder that sticks to the side of the bath by suction, rubber flowers, and the latest fashions in rubber hats, mackintoshes, shoes, and Wellingtons.

Princess Louise was received by Sir Stanley Bois and W. Duncan, chairman of the Rubber Growers' Association, and she was presented with a large bouquet of pink roses by Mrs. McGarvie Munn, the inventor of rubber flowers. She congratulated those who had organized the exposition, and Sir Stanley Bois responded by declaring that it represented large interests under the control of British planters, as well as the work of rubber manufacturers, without whom the producers of the raw material could do nothing.

CATALPO!

Rubber Growers' Manual

The 1928 edition of "Rubber Producing Companies," compiled by the Mincing Lane Tea and Rubber Share Brokers' Association and published by the London *Financial Times*, has just been issued. Details are included on practically every British company, with the purchase price, crop yield, summary of accounts, forward sales, estimates, and other statistics. It contains 700 pages.

Rubber Institution Meetings

The regular meeting of the London and District section of the Institution of the Rubber Industry at the Blackfriars Theatre, London, on January 7 was addressed by F. W. Bennett, F. I. R. I., on the topic of "Factory Organization in the Rubber Industry Affecting the Conditions of the Worker." No subject for discussion at the meeting of January 21 has yet been announced. The Birmingham section will be addressed on January 10 by W. W. Hamill on "An Appreciation and Criticism of the Motor Tire," and the Manchester section on January 24 will hear a paper on "Storage of Steam" by Dr. E. B. Ritchie. No topic has been announced for the January meeting of the Scottish section.

End Rubber Experiments

Much of the experimental rubber work previously planned and started by the United States Department of Agriculture will have to be abandoned and curtailed during the next fiscal year, due to a decrease in appropriations in the bill now before Congress. The chief curtailment will occur in the work in the tropical and subtropical possessions of the United States, such as the Panama Canal Zone and the Philippine Islands. Experiments with the guayule plant in the Salinas Valley of California are to be continued.

NEW RUBBER JOINT USED FOR PIPES OF CONCRETE

A form of rubber joint for reinforced concrete pipe, invented by a French engineer, has proven highly successul on test. The joint is made in such a way that it is compressed when inserted between lengths of pipe so that water pressure tends to tighten it against the walls of the pipe and render it watertight.

It is stated that the joint facilitates the laying of pipe, which is accomplished merely by pushing one length of pipe into the end of the other with the rubber joint interposed. It is also possible to lay pipes under water without difficulty by this method. The outside of the joint may be filled, if desired, though it is claimed that an unfilled rubber joint makes the pipe line flexible without developing leaks.

SCRAP RUBBER FINDING WIDE MARKET IN FRANCE

Rubber scrap is being more widely utilized in France for the manufacture of numerous articles of daily use, according to a recent report rom the American consulate at Paris. Inner tubes are used in the manufacture of suspenders and small rubber goods of all descriptions, which may be cut directly from the more or less damaged used tube.

The latest use of scrap rubber in France is the employment of the pneumatic casing in cheap soles for inexpensive shoes. After the necessary process of flattening, to give the old casing the proper surface for a shoe sole, they are cut into the desired form, thus yielding a sole with three or four thicknesses of cord inlaid with rubber. It is reported that such soles offer excellent and inexpensive substitution for the more expensive cord or cheap leather soles utilized heretofore.

Inquiries show, however, that, while American offers of inner tubes are frequent and purchases are large, offers of used casings from the United States are seldom received, and when received are priced above those from scrap dealers in Great Britain and the Netherlands. The Netherlands have become a purchasing point for casings from Germany and Central Europe. Paris scrap dealers say that American casings would be welcome in the French market, particularly because of the fact that they are usually less worn than those from other countries.

MALAYA IS INTERESTED IN DR. WHITFORD'S VISIT

Considerable interest has been aroused in Malaya by the arrival there in October of Dr. H. N. Whitford, of the Rubber Association of America, who is to spend a year in that country on a special mission. Newspapers in Penang and other parts of the peninsula view his visit as an example of the close attention which American rubber manufacturers are giving to their sources of supply.

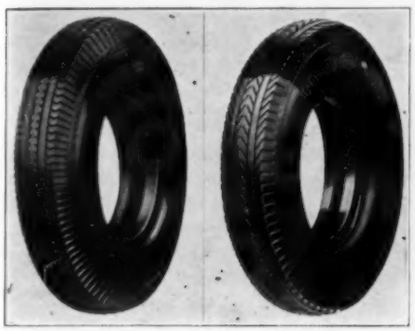
"What I am concerned with," Dr. Whitford recently declared to one of the Straits Settlement newspapers, "is a long-distance view of the raw rubber situation. American manufacturers, like all others, look far ahead. Every big organization in the United States has its statistical department which is estimating what the future supplies of its raw materials will be, and that is what the Rubber Association is doing. The question I am trying to answer is not what the immediate situation is, but what is going to happen in the future.

"My work is more scientific than practical. We want to know how permanent these plantations of yours are—how long they are going to last, and the effect which the new scientific methods of production are going to have on future supplies."

Rubber Goods and Specialties

New Ajax Tires

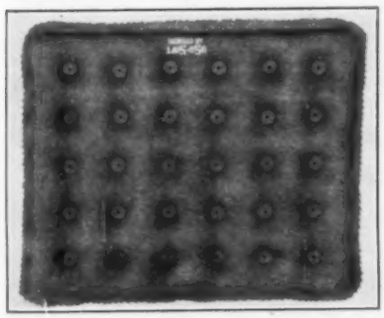
The Ajax Rubber Company, Racine, Wis., has recently introduced two new lines of automobile tires under the names of Ajax Gold Bond and Ajax Gold Shield. The former is to be backed by an 18-month war-



ranty that covers virtually every possible tire injury. It is described as being a quality product to be sold at popular prices, and under the terms of the "Gold Bond Performance Contract" issued with each casing, the purchaser is guaranteed for a year and a half against blowouts, cuts, bruises, wheels out of alignment, underinflation, accidents and any other road hazards that may render the tire unfit for service. All authorized Ajax dealers are empowered to fulfill the terms of the contract. The Gold Shield is the Ajax casing built to compete with the new "super" class of tires. It is a specially heavy-built tire, using unusually large quantities of rubber and finished with the best possible workmanship.

Rubber Sport Cushion

The spectator at athletic games, the motorist, the canoeist, and the convention delegate will all find these "Oso-Soft" rubber pneumatic cushions a means to added comfort. This is one of fifty different styles of these cushions manufactured by the Eno



Rubber Corporation, 1726 South Los Angeles street, Los Angeles, Cal., and is called the "Collegiate" model. It is made in two sizes of 11 by 14 inches and 14 by 18 inches, weighing 10 and 13 ounces, respectively. The cushion can be easily inflated by placing the lips against the valve provided and blowing as on a toy balloon or football. When used in canoes or boats, they have the secondary purpose of acting as an efficient life preserver.

Golf Club Grip

As a substitute for the leather grip which becomes slippery when exposed to perspiration or when the hands are very dry, this Vaco patented vacuum-cup, soft rubber golf club grip is being manufactured by Golf Masterpieces, Inc., Hanna Building, Cleveland, O., and distributed by the Zinke Company, 1323 South Michigan avenue, Chicago, Ill. The soft rubber surface offers a perfect control of the club when the hands are dry, and the patented holes create a vacuum when wet, insuring a firm grip. The highly cured rubber gives the desired "roughness" for a steady grip, but its spongy texture protects the skin from chafing and blistering and thus will not make the hands sore as do some "rough" grips with an open surface. The Vaco grip may be wound about any club easily and in but a few moments.

Lather Gun

Under the name of the Latherizer, a device to eliminate shaving brushes and the usual shaving cream tube is being marketed by the Latherizer Corporation, 452 Fifth avenue, New York City. It consists of a nickle-plated container, weighing seven ounces, which includes soap, air, water and

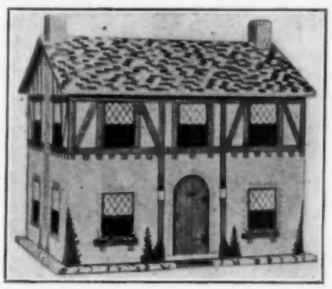
screen chambers, a cone, tube, check-valve, spirals, silk-like screens and an attached rubber bulb. When the bulb is squeezed, air passes through the water-chamber and the aerated water washes over a cake of soap and forms bubbles. These bubbles are blown violently through four 150-mesh nickel screens and ejected through a spout as lather. It is claimed to be both sanitary and convenient and is being sold to barber shops and to the public through drug and department stores.

U. S. Capping Gum

The United States Rubber Company, 1790 Broadway, New York City, has announced a new addition to its line of repair materials in the form of U. S. capping gum. This material is designed for recapping or replacing the non-skid portion of the tread of a tire that has become worn off, but is not intended for retreading tires whose tread has become worn off so that the breaker strip or cords are exposed. U. S. capping gum is a three-ply calendered stock, beveled at the edges to an angle of 45 degrees, and is made in six different sizes to take care of every passenger car tire. It is put up in 25-pound rolls.

Toy House With Rubber Legs

Combining the advantages of being educational, indestructible, collapsible and attractive, these Cozytown doll houses are being manufactured by the Frier Steel Company, 3306 Washington Avenue, St. Louis, Mo.



All edges are safely rounded, and the house itself is supported on rubber feet to prevent scratching furniture or the floor. The houses are marketed ready to be put together by children, and in the operation of assembling a bolt dropped in each rear top corner holds the walls in position while the youngster inserts the four rubber legs. The houses are made in various styles at several different prices.

Golf Shoe

The sole used on this new golf shoe manufactured by Getty & Scott, Ltd., Galt, Ontario, Canada, is made of a composition of resilient gum rubber to which is attached by their own method moulded high pressure tire tread rubber "spikes." These rubber cleats are said to be as effective as steel

cleats, but they can be worn on fairways and greens and over the hardest roads and pavements.

Tobacco Pouch

Made entirely of rubber, but finished to look like crocodile leather, these tobacco pouches are finding a wide market in Eng-

land and may be introduced into the United States. They are manufactured by William Warne & Company, Ltd., London, England.

Current Crude Rubber Items

LIBERIA REPORTS ON PROGRESS IN RUBBER

President King's Annual Message Tells of Planting 30,000 Acres on Firestone Concession and Employment of 10,000 Workers.

IN HIS recent annual message to the national legislature, President Charles D. B. King of Liberia summarized graphically the achievements of the Firestone Plantations Company in introducing the cultivation of rubber into the country. "The rapidity with which the company is developing its estates in Liberia, under the most capable direction and management of Dr. D. A. Ross, its general manager, is indeed wonderful and gratifying," he declared.

The estimated number of rubber trees planted and growing is at present 6,000,000 on the 30,000 acres thus far developed, according to President King. The average number of Liberians on the company's payroll each month of the past year was 10,000, including both skilled and unskilled, and the estimated sum paid out in wages to Liberian workers during the year totaled $1,024,000. Skilled Liberian workers alone, such as mechanics, motor drivers, carpenters and bookkeepers, numbered 700 and drew wages amounting to $250,000.

"During the past 18 months," President King reports, "it is pleasing to know that the company has distributed free to Liberian farmers more than 30,000 rubber tree stumps and 100,000 rubber seeds. The company has recently imported from Sumatra 10,000 of the finest bud-grafted specimens of rubber stumps and transplanted them in Liberian soil with thus far good results. This experiment has the possibility of establishing a reputation for Liberia as the finest and best rubber growing country in the world, by giving Liberia the most scientifically improved rubber tree stock available anywhere. Liberia's favorable climate and excellent soil, combined with this high grade stock, may soon make Liberia the home of the highest producing rubber trees in the world.

"Within the short period of its operations in Liberia, large tracts of land have been cleared and put under rubber cultivation by the company. Beautiful bungalows with the most modern improvements for the housing of the foreign staff, have been erected. There are well laid out streets running through their living compounds; excellent motor roads have been constructed connecting their several planting divisions, eight in number, along the Du, in Montserrado County, each covering on an average 3,000 acres.

"The large and powerful electric ice-making machines, high and stately water towers, well-equipped machine and carpenter shops, spacious and commodious central office buildings, together with a large fleet of trucks and automobiles, present every aspect of a growing industrial and commercial centre. During the year the company brought to Liberia Dr. A. W. Sellards, a noted Harvard University medical scientist, who has made a careful study of tropical diseases in Liberia, with every promise of excellent results."

CATALPO!

FORD SEEKS RADIO LINK WITH BRAZIL

Henry Ford, through his private secretary, Ernest G. Leibold, applied to the Federal Radio Commission on December 21 for a short-wave channel for communication with stations he is erecting in Brazil in connection with his rubber plantation concession there. Mr. Ford now has four stations in Dearborn, Mich.

The Radio Commission announced on December 26 that it had denied applications from the Firestone Tire & Rubber Company, the Firestone Footwear Company, the Firestone Cotton Mills and the Goodyear Tire & Rubber Company, for channels for point-to-point radio communication.

TRADING IS UNCHANGED WITH RUBBER FUTURES

Activity Is Only Slightly Greater Than During First Two Weeks of December With Little Factory Interest and Light Buying.

SCARCELY greater activity than in the previous fortnight was noticeable during the last two weeks of trading on the Rubber Exchange of New York. In view of the holiday season and the general policy of "watchful waiting" adopted by most factors, buying support was hardly moderate and selling pressure relaxed.

Prices quoted on January 4 varied from unchanged to 30 points higher than those recorded on December 17. The spot price remained stable at 18 cents, although during the period it had fluctuated between 17.80 and 18.20. The May price was also unchanged, but quotations for the other positions between January and July gained 10 points. The August position advanced 20 points, while September, October and November each gained 30 points over the December 17 quotations.

As the period closed, a firmer tone was the feature of the market. On some early buying support attributed to the improvement in the London cables, prices advanced as much as 20 points and held the top levels throughout the session, with offerings slightly higher and sellers continuing a cautious attitude. There seemed to be every evidence that the next few days would see advanced prices.

Factors seem to be content to let the action of the English market be the dominating interest. With London uncovering rallying tendencies due to good buying on the part of dealers and larger American interests, the firmer appearance assumed on the New York exchange resulted.

Closing Prices on Rubber Exchange of New York, Inc.

FROM DECEMBER 18, 1928, TO JANUARY 4, 1929

		Spot	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Sales*
Dec.	18	17.90	17.70	17.80	18.00	18.20	18.30	18.40	18.50	18.70	18.70	18.80	18.90	——	158
	19	17.90	17.60	17.80	17.90	18.10	18.30	18.40	18.50	18.60	18.60	18.80	18.90	——	269
	20	17.90	17.60	17.80	18.00	18.20	18.30	18.40	18.50	18.70	18.80	18.90	19.00	——	304
	21	17.90	17.60	17.80	17.90	18.00	18.20	18.40	18.50	18.60	18.70	18.80	18.90	——	540
	22	18.00	17.60	17.80	17.90	18.10	18.20	18.30	18.40	18.60	18.80	18.80	18.80	——	109
	24	18.00	17.60	17.80	17.90	18.10	18.30	18.40	18.50	18.60	18.70	18.80	18.80	——	72
	26	17.80	17.60	17.80	18.00	18.10	18.20	18.40	18.50	18.60	18.80	18.90	19.00	——	180
	27	17.90	17.70	17.80	17.90	18.10	18.30	18.40	18.50	18.60	18.80	18.90	19.00	——	218
	28	18.00	17.80	17.90	18.10	18.30	18.40	18.60	18.80	18.90	19.00	19.10	19.20	——	314
	29	18.20	18.00	18.10	18.30	18.50	18.50	18.70	18.90	19.00	19.10	19.30	19.40	——	190
	31	18.10	17.80	18.00	18.20	18.40	18.50	18.70	18.80	18.90	19.00	19.00	19.20	——	304
Jan.	2	18.00	17.70	17.90	18.20	18.40	18.50	18.60	18.70	18.80	18.90	19.00	19.10	19.20	100
	3	18.00	17.70	17.90	18.10	18.20	18.30	18.40	18.60	18.70	18.80	18.90	19.00	19.10	56
	4	18.00	17.80	18.00	18.10	18.30	18.40	18.60	18.70	18.90	19.00	19.10	19.20	19.30	137

*In lots of 2½ tons each

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HINSON RECEIVES ORDER FOR FORD TIRE COVERS

The Hinson Manufacturing Company, Waterloo, Ia., is now working on a new order for tire covers from the Ford Motor Company, which will consume a third of the factory output for December and January. It is the largest order received in recent months, representing about 30,000 tire covers.

Production schedules have reached such a high point that the plant for the first time in many months has abandoned its half-day Saturday policy and is working six full days a week.

Vansul in New Quarters

Vansul, Inc., dealers in colors, clays, minerals, mineral rubber, and other rubber compounding materials, have moved into new quarters at 37-41 Water street, New York City, where, in addition to increased office space, they have added a testing laboratory containing a mill, calender, press, vulcanizer, tensile tester, electric ageing oven and other equipment. Storage facilities are also provided in adjoining space. The new telephone numbers of the firm are Whitehall 8761 and 8762.

Rubber Trade Association Moves

The first of the year found the Rubber Trade Association of New York, Inc., in new quarters at 14 South William street, New York City, where the members have larger offices and are in closer proximity to the "rubber district." The former address of the association was 89 Broad street.

Brown Instrument Moves

The Brown Instrument Company of Philadelphia, Pa., has moved its New York City office from 50 Church street to the Roebling Building, 117 Liberty street. The change in quarters will provide considerably more space for the company.

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BOSTON—176 Federal Street.
CHICAGO—327 So. LaSalle Street.
LOS ANGELES—728 So. Hill Street.

WAREHOUSES—JERSEY CITY, N. J., and AKRON, OHIO

FIRESTONE WILL BUILD WAREHOUSE AT NEWARK

Feist & Feist, Inc., have acquired for the Firestone Tire & Rubber Company the property located on Central avenue between Third and Fourth streets, Newark, N. J. The Firestone company plans to demolish the buildings now on the site and to erect a four-story building to be used as the organization's main New Jersey sales and distributing station. The warehouse will be constructed by the Public Service Production Company, a division of United Engineers and Constructors, Inc.

The new warehouse will be one of a series of similar buildings maintained by the company in a number of the larger cities. The ground floor of approximately 22,000 square feet will be used for retail purposes, probably by one of the local Firestone retailers.

COLLETTE CUSHION TIRE NEW WISCONSIN COMPANY

The Collette Cushion Tire Company has been organized to operate a tire manufacturing plant at Manitowoc, Wis. The officers of the new organization are Hugh L. Vits, president; Guy Collette and Oscar M. Richter, vice-presidents; Elton Hanson, secretary; Guido Rahr, treasurer; L. J. Wagner and E. W. Lawton, directors.

Mr. Collette, who has been engaged in the rubber business and the manufacture of tires for many years, was for eight years past a director of one of the large plants at Akron, O. The new company will manufacture tires for heavy trucks.

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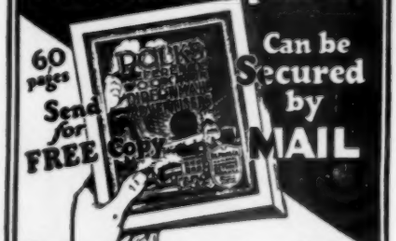

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LATE MARKET PRICES

Crude, Scrap & Reclaimed Rubber - Cottons and Fabrics

NEW YORK, JANUARY 4, 1929

COTTON

FOR the year of 1928 the average price of middling upland cotton on the New York market has been 19.97 cents as against 17.49 cents for 1927. The spot quotations during the past fortnight have remained firmly above the 20-cent mark, and the December average price was 20.22 cents a pound. Recent days, however, have seen a gradual decline, and quotations under the 20-cent mark may be expected during this month.

The market on entering the New Year has failed to develop any new tendencies, and the factors which have been responsible for recent minor fluctuations continue to predominate. There is reason to believe that 1929 production may not keep pace with consumption, but that is a matter for the distant future. The textile industry is in better shape at present than it has been for some years past, and a stabilized price for the raw product should bring new prosperity to that field and add to the earnings of tire manufacturers.

	High	Low Jan. 4	Close	Close Dec. 17
January	20.01	19.75	19.78	20.24
March	20.07	19.78	19.84	20.26
May	20.09	19.84	19.88	——

Tire Fabrics

During 1928 the consumption of cotton fabric by the tire industry amounted to approximately 300,000,000 pounds, as compared with the 1927 total of 237,306,424 pounds as estimated by the Rubber Association of America, Inc. In recent weeks the tire fabric market has been quiet with prices practically unchanged, the only activity being some slight buying of carded peeler cords for April and May delivery. Late prices follow:

CORD				
Peeler, carded, 23/5/3	lb.	.47	@	.48
Peeler, carded, 23/4/3	lb.	.48	@	.49
Peeler, carded, 13/3/3	lb.	.44	@	.45
Peeler, carded, 15/3/3	lb.	.44½	@	.45½
Egyptian, carded, 23/5/3	lb.	.53	@	.53½
Egyptian, combed, 23/5/3	lb.	.59	@	.59½
CHAFERS				
Carded, American, 8 oz.	lb.	.39½	@	.41
Carded, American, 10 oz.	lb.	.40	@	.41
Carded, American, 12 oz.	lb.	.40	@	.43
Carded, American, 14 oz.	lb.	.39	@	.43
LENO BREAKER				
Carded American, 8¼ oz.	lb.	.40	@	.44
Carded American, 10¼ oz.	lb.	.40	@	.44
SQUARE WOVEN				
Carded American, 17¼ oz. 23-11 ply	lb.	.47		
Carded American, 17¼ oz. 10-ply	lb.	.40	@	.41

Sheetings

The market in sheetings has seen no change in price and little buying activity in the past fortnight. The supplies now on hand at rubber factories are apparently adequate for some time to come, and no selling pressure is evident. Late price quotations were as follows:

40-inch, 2.50-yard	yd.	.12⅞	@	.13
40-inch, 2.85-yard	yd.	.11⅝	@	.11½
40-inch, 3.15-yard	yd.		@	.12
40-inch, 3.60-yard	yd.	.09⅞	@	.10
40-inch, 3.75-yard	yd.	.08⅝	@	.08¾
40-inch, 4.25-yard	yd.	.07⅝	@	.07¾

Ducks

Enameling ducks have witnessed some slight activity with an advance in price during the past fortnight, but in other respects the market in these goods has been unchanged and extremely quiet. Rubberizing factories have apparently satisfied their immediate needs, and a renewal of interest is not expected for some weeks. Latest prices follow:

Belting and Hose	lb.		@	.37½
Enameling	lb.	.36	@	.38
Single filling	lb.	.14¾	@	.17½
Double filling	lb.	.17½	@	.18½

RECLAIMED RUBBER

The New Year opened with lower price quotations on high tensile and tube reclaim, but with tire prices holding firm. The difference in the case of the former, however, was in no case more than a half a cent to the pound, indicating that reclaimed rubber should continue to be as steady, if not steadier, than crude in price. Stocks are fairly high at the present time, but consumption in the first part of the year is expected to result in reductions and to make a heavy supply necessary. Latest quotations follow:

High Tensile				
Super-Reclaim No. 1 Black	lb.	.12	@	.12½
Super-Reclaim No. 2 Black	lb.	.11	@	.11⅛
High Tensile Red	lb.	.12½	@	.13
Shoe				
Unwashed	lb.	.07¼	@	.07½
Washed	lb.	.10	@	.10¼
Tube				
No. 1 (Floating)	lb.	.13½	@	.14
No. 2 (compounded)	lb.	.10½	@	.11
Tires				
Black, washed		.09½	@	.10
Black, unwashed		.07½	@	.07¾
Black selected tires	lb.	.08	@	.08¼
Dark Gray	lb.	.09½	@	.09¾
Light Gray	lb.	.12	@	.12¼
White	lb.	.13	@	.13½
Truck, Heavy Gravity	lb.	.07	@	.07¼
Truck, Light Gravity	lb.	.07½	@	.07¾
Miscellaneous				
Mechanical Blends	lb.	.06⅝	@	.07½
Red	lb.	.12½	@	.13

Scrap Rubber

Demand for scrap rubber continues steadily, but not with the same high rate as in the past summer and fall. Consumption during 1928 is estimated in various sources at amounts anywhere up to 250,000 tons, and the prospects for 1929 are considered excellent in all quarters, despite the low price of crude rubber. Lower prices have recently been quoted on white auto tire, but boots and shoes and inner tubes are slightly higher.

(Prices to Consumer)

Auto tire peelings	ton	39.00	@	42.50
Standard White auto	ton	47.50	@	50.00
Mixed auto	ton	24.50	@	25.00
Bicycle tires	ton	20.00	@	22.50
Clean solid truck tires	ton	22.00	@	24.00
Boots and shoes	cwt.	1.40	@	1.55
Arctics, untrimmed	lb.	.00¾	@	.00⅞
Inner tubes, No. 1	lb.	.06½	@	.06¾
Inner tubes, No. 2, compounded	cwt.	4.25	@	4.30
Inner Tubes, Red	lb.	.05¼	@	.05⅝
Air Brake Hose	ton	34.00	@	35.00
Rubber Hose	ton	17.50	@	20.00

CRUDE RUBBER

ALTHOUGH the average spot price for ribbed smoked sheets in the New York market was above 22 cents a pound for the year of 1928, this has been held up only by the high quotations in the first two months before the announcement that restrictions would be withdrawns in the Far East. The price during December slumped to 17.97 cents, falling below the 18-cent mark for the first time since September, 1922.

The heavy January arrivals of crude rubber that are expected remain the only factor that is checking bullish enthusiasm in rubber trading. Were it not for the fact that arrivals this month will be considerably above those for December, factories would enter the market on a much broader scale.

The caution which has characterized rubber dealings since the New Year began continues to be in evidence, and it was felt that traders are equally as willing as the factories to await the effect of record imports on values before assuming a position in the market. The previous import record of 46,200 long tons, made in April, 1927, is expected to be far surpassed this month.

Price quotations at the end of the fortnight were slightly higher and steadier than in the middle of December. Some of the Para grades had advanced as much as half a cent during the period, and all appeared firm in the closing days.

Prices on the New York outside market on January 4 were as follows:

Plantations—			
Ribbed Smoked Sheets—			
Spot Jan.	.17⅞	@	.18¼
Feb.-Mar.	.18	@	.18¼
Apr.-June	.18⅝	@	.18⅝
July-Sept.	.18¾	@	.19
First Latex, crepe spot	.18⅝	@	.18½
Amber Crepe, No. 2	.17¼	@	.17½
Amber Crepe, No. 3	.17	@	.17¼
Amber Crepe, No. 4	.16¾	@	.17
Brown Crepe, Rolled	.13	@	.13¼
Brown Crepe, Clean, thin	.17	@	.17¼
Brown Crepe, specky	.16¾	@	.17
Liquid Latex, per gal.	1.00		
Paras—			
Up-river Fine	.19½	@	.19¾
Up-river Medium	Nominal		
Up-river Coarse	.13¾	@	.14
Acre Bolivian, fine	.20½	@	.21
Caucho Ball, Upper	.12¾	@	.13
Islands, fine	Nominal		
Centrals—			
Central, scrap	.12	@	.12½
Esmeraldas	.12	@	.12½
Balata—			
Block, Colombia	Nominal		
Block, Cuidad	.50	@	—

LONDON MARKET

Standard Ribbed Smoked Sheets—Buyers			
Spot-Feb.	8⅝	@	8¾d
Mar.-June	8¾	@	9d

SINGAPORE MARKET

Standard Ribbed Smoked Sheets—Sellers			
Spot	8⅛	@	8¼d

Charles T. Wilson Co., Inc.
44 Beaver Street New York

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Members Rubber Exchange Clearing House, Inc.

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1775 BROADWAY NEW YORK CITY

LATE RUBBER CHEMICAL PRICES

Accelerators — Colors — Softeners — Compounding Materials

NEW YORK, JANUARY 4, 1929

WITH the start of the New Year, the prices on sulphur herewith recorded went into effect. These are on the average about 20 per cent lower than the quotations current during 1928 and are a result of economies brought about by the rapid increase in consumption.

The feeling prevails that 1929 will be even a better year for manufacturers of rubber chemicals and compounding ingredients than was the past record breaking year. The plant expansion by the Grasselli Chemical Company may be followed in the near future by the announcement of plans for plant enlargement by other manufacturers. Prices are not expected to fluctuate greatly during the coming twelve months, as production is estimated to keep pace as far as possible with consumption.

Popular accelerators should have an even better year, and anti-oxidants, which are coming into favor, should show material increases in use during 1929. There will be the usual demand for the better types of compounding ingredients, softeners, colors, and other essentials of rubber good manufacture.

ACCELERATORS

Organic			
A-7	lb.	.55 @	.59
A-11	lb.	.62 @	.66
A-16	lb.	.57 @	.61
A-19	lb.	.58 @	.62
A-20	lb.	.64 @	.68
Aero-X	lb.	.75 @	—
Aldehyde ammonia, crystals	lb.	.65 @	.70
Aniline oil, drums, f.o.b. works	lb.	.15 @	.16¼
Crylene	lb.	.55 @	.65
paste	lb.	.45 @	.55
Di-Ortho-Tolylguanidine	lb.	.44 @	.46½
Diphenylguanidine	lb.	.35 @	.37½
Ethylidene aniline	lb.	.45 @	.47½
Formaldehyde Aniline, 140° m. p	lb.	.37½@	.42½
Formaldehyde Aniline, 60° m. p.	lb.	.35½@	.38
Grasselerator 102	lb.	.62½@	.63½
Grasselerator 552	lb.	— @	4.45
Grasselerator 808	lb.	.80 @	.85
Grasselerator 833	lb.	1.17 @	1.30
Heptene	lb.	.40 @	—
Hexamethylene-tetramine	lb.	.62½@	.65
Lithex	lb.	.18 @	.20
Methylenedianiline	lb.	.37½@	.40
Monex	lb.	3.25 @	—
Oynone	lb.	.68 @	.80
Para-Nitrosodimethylaniline, f.o.b. works	lb.	.92 @	.96
Piperidine-Piperidyldithio-Carbamate	lb.	4.45 @	4.60
R & H 40	lb.	.40 @	.42½
R & H 50	lb.	.40 @	.42½
R & H 397	lb.	.75 @	.77½
Safex	lb.	1.20 @	1.25
Tensilac, No. 39	lb.	.50 @	.52½
Tensilac, No. 41	lb.	.50 @	.52½
Thermlo F	lb.	.50 @	.55
Thiocarbanilide, drums	lb.	.26½@	.28½
Thionex	lb.	3.25 @	—
Trimene	lb.	.75 @	—
base	lb.	1.20 @	—
Triphenylguanidine	lb.	.59 @	.62½
Vulcanex	lb.	.68 @	—
Vulcone	lb.	.68 @	—
Vulcanol	lb.	1.03 @	1.08
Waxene	lb.	.30 @	.32
Z 88	lb.	.65 @	.69
Inorganic			
Lead, sublimed blue	lb.	.07¾@	—
Lead, white	lb.	.10½@	.12½
Litharge, domestic	lb.	.09 @	—
Magnesia, calcined, light	per 100 lb.	5.35 @	5.45
heavy	per 100 lb.	3.65 @	3.75

COLORS

Blacks (See Compounding Materials)			
Blues			
Prussian	lb.	.32 @	.35
Ultramarine	lb.	.06 @	.30
Browns			
Sienna, Italian	lb.	.05½@	.12½
Umber, Turkey	lb.	.04½@	.07
Greens			
Chrome, light	lb.	.27 @	.31
medium	lb.	.29 @	.32
dark	lb.	.31 @	.34
Chromium Oxide, bbl.	lb.	.34 @	.36
Reds			
Antimony crimson, 15/17	lb.	.44 @	.50
sulphur free	lb.	.50 @	.55
golden 15/17 F.S.	lb.	.20 @	.25
Indian English	lb.	.08 @	.12
Domestic (Maroon)	lb.	.08 @	.12
Oximony	lb.	.13¼@	—
Red oxide, pure	lb.	.10 @	.12
Venetian red	lb.	.03 @	.06
Vermillion, quicksilver, English	lb.	1.85 @	1.95
Whites			
Lithopone, Akcolith	lb.	.05 3/5@	.06
Lithopone, Azolith	lb.	.05¼@	.05¾
Lithopone, Vanolith	lb.	.05⅝@	—
Titanox	lb.	.09½@	.10
Cal. Base Pigment	lb.	.10 @	.10½
Zinc Oxide—American Process			
American Azo:			
ZZZ (lead free)	lb.	.06½@	.07
ZZ (leaded)	lb.	.06⅝@	.06⅞
Zinc Oxide—French Process			
White seal	lb.	.11⅞@	—
Green seal	lb.	.10⅞@	—
Red Seal		.09¾@	—
Yellows			
Chrome	lb.	.15½@	.16½
Ocher, French medium	lb.	.03½@	.06
domestic	lb.	.01⅝@	.02

COMPOUNDING MATERIALS

Aluminum Flake	ton	21.85 @	24.50
Ammonia carbonate	lb.	.10½@	.12
Asbestine	ton	14.75 @	18.00
Barium carbonate	lb.	.03½@	.05
Barium Dust	lb.	.05 @	.06
Barytes southern off-color,	ton	12.00 @	18.00
Western prime white	ton	23.00 @	—
imported	ton	27.00 @	36.00
Basofor	lb.	.04½@	—
Blacks			
Arrow "Aerfloted"	lb.	.08½@	.12½
Bone Black	lb.	.05½@	.11
Carbon, compressed	lb.	.08 @	.12
Carbon, uncompressed	lb.	.07½@	.11½
Drop Black	lb.	.06 @	.10
Fumonex	lb.	.06 @	.09
Gastex	lb.	.05¼@	.05½
Lamp Black	lb.	.12 @	.40
Micronex	lb.	.08½@	.12½
Velvetex carbon	lb.	.04½@	.06
Blanc fixe dry f.o.b. works	lb.	.03½@	.03⅝
Carrara filler	lb.	.01¾@	.02
Catalpo (fact.)	lb.	.02 @	—
Chalk	ton	12.00 @	14.00
Clay, China, domestic	ton	8.00 @	9.00
Aerfloted Suprex	ton	10.00 @	22.00
Congaree, c. l. f.o.b. mine	ton	9.00 @	—
Mineral Flour, c. l. fob mine	ton	20.00 @	23.00
Tensulite		15.00 @	—
Glues, extra white	lb.	.22 @	.26
medium white	lb.	.20 @	.24
Magnesia, carbonate	lb.	.08¾@	.11
Mica, powdered	ton	65.00 @	80.00
Rotten Stone (powdered)	lb.	.02½@	.04½
Soapstone, powdered	ton	15.00 @	22.00
Starch, powdered	cwt.	3.30 @	3.70
Talc, domestic	ton	12.00 @	15.00
Whiting, commercial	cwt.	.85 @	1.00
English cliffstone	cwt.	1.50 @	—
Superfine	ton	10.00 @	12.00
Witco	ton	12.00 @	—
Wood pulp XXX	ton	45.00 @	—
Wood pulp X	ton	25.00 @	—
Zinc Carbonate	lb.	.09½@	.10½
Zinc Stearate	lb.	.24 @	.25

MINERAL RUBBER

Genasco (factory)	ton	50.00 @	52.00
Montezuma, solid	ton	28.00 @	36.00
Montezuma, granulated	ton	32.00 @	42.00
Paradura	ton	62.50 @	65.00
Pioneer, MR, solid	ton	42.00 @	45.00
Pioneer-granulated	ton	52.00 @	55.00
R & H Hydro-Carbon	ton	27.05 @	29.00
Robertson, MR, solid	ton	34.00 @	80.00
M.R. (gran)	ton	38.00 @	80.00

SOFTENERS

Acids			
Nitric, 36 degrees	cwt.	5.00 @	5.25
Sulphuric, 60 degrees	ton	10.50 @	11.50
66 degrees	ton	15.00 @	16.00
Tartaric, crystals	lb.	.35 @	.36
Acids, Fatty			
Stearex	lb.	.15 @	.20
Stearic, double pressed	lb.	.18 @	.22
Alkalies			
Caustic soda, 76%	cwt.	3.76 @	3.91
Soda ash, 58% C.L.	cwt.	1.40 @	
Oils			
Corn, refined, bbls.	lb.	.11 @	.11½
Cottonseed, crude		.08½@	.08¾
Cycline	gal.	.27 @	.34
Degras (c.l. 100 bbls.)	lb.	.03¾@	—
Less c. l. (10-25 bbls.)	lb.	.04 @	—
Lots less than 10 bbls.	lb.	.04¼@	.04½
Fluxrite	lb.	.05 @	.06
Hexalin	lb.	.60 @	—
Acetate	lb.	.70 @	—
Linseed, Raw C.L. bbl.	lb.	.09½@	.10
Palm Lagos	lb.	.07¼@	.07½
Niger	lb.	.07¾@	.08
Vansulol	lb.	.10½@	.—
Para-Flux	gal.	.17 @	—
Peanut, domestic, crude	lb.	.12 @	.12¼
Petrolatum, white	lb.	.08 @	.08½
dark amber	lb.	.03⅝@	.03⅝
Pine, steam distilled	gal.	.65 @	.70
Rapeseed, refined	gal.	1.04 @	1.06
second rectified	gal.	.58 @	—
Resins and Pitches			
Pitch, Burgundy	lb.	.06½@	.07½
coal tar	gal.	.05½@	.06
pine, 200 lb. gr. wt.	bbl.	9.00 @	10.00
Rosin, grade K, 280 lb. bbl.	bbl.	8.55 @	—
Pigmentar	gal.	.33 @	.41
Solvenol, drums	gal.	.48 @	.50
Tarol, drums	gal.	.30 @	.35
Tar Retort, 50 gal.	bbl.	12.50 @	13.00
Solvents			
Acetone, pure	lb.	.13 @	
Alcohol denatured, No. 1 bbls.	gal.	.37½@	.44½
Benzol, 90%	gal.	.28 @	—
Carbon bisulphide	lb.	.05½@	.06¼
Carbon tetrachloride	lb.	.06¼@	.07
Motor gasoline, steel bbls.	gal.	.17 @	—
Naptha, solvent	gal.	.35 @	.40
Turpentine, spirits	gal.	.60 @	.64
wood	gal.	.50 @	.54
Waxes			
Beeswax	lb.	.56 @	.58
Carnauba	lb.	.33 @	—
Ceresin, white	lb.	.10 @	.11
Montan, crude	lb.	.07 @	.07½
Ozokerite, black	lb.	.24 @	.25
green	lb.	.26 @	.30
Miscellaneous			
RSL Mold Solution	gal.	.75 @	1.00

ANTI-OXIDANTS

Antox	lb.	.79 @	.83
Neozone	lb.	.74 @	—
Oxynone	lb.	.68 @	.80
Resistox	lb.	.54 @	.57
Stabilite	lb.	.65 @	—
VGB	lb.	.55 @	.66

SUBSTITUTES

Black	lb.	.08 @	.14
White	lb.	.10 @	.16
Brown	lb.	.08 @	.15

VULCANIZING INGREDIENTS

Sulphur Chloride (drums)	lb.	.03¼@	.03½
Sulphur flour, Refined, 100% pure (bags)	cwt.	2.40 @	2.75
Commercial (bags)	cwt.	1.75 @	2.10

TIRES & TUBES
CRUDE RUBBER

STATISTICAL SECTION

AUTOMOBILES
GASOLINE

WITH the end of 1928, there closed the most momentous year in the history of the rubber industry. New records were made in all branches of the industry, and all indications point to the continuance of this activity throughout 1929 with the possibility of further peaks being attained.

Consumption of crude rubber in the United States during 1928 is estimated at slightly below 440,000 long tons as compared with 372,528 long tons absorbed in 1927. Production of automobile tires last year reached a total of approximately 79,000,000 casings as against the 1927 total of 64,439,000. Other rubber products are believed to have advanced, although not at the same high rate.

Imports have not kept pace with domestic consumption, owing to the developments following the announcement that British restrictions would be abandoned. Crude rubber brought into the United States in 1928 approximated 405,000 long tons, resulting in a shrinkage of American stocks to the amount of 35,000 tons. This means that while the stock on hand in this country on December 31, 1927, was 100,130 tons, this stock had dropped to about 65,000 tons by the end of last month. Large shipments from Malaya now afloat to the United States are expected to restore this position.

The average price of ribbed smoked sheets in the New York market during 1928 was 22.48 cents a pound, the lowest since 1922, and the December average price dropped to 17.97 cents, the first time in the record of these monthly averages it has been below 18 cents since September, 1922.

Latest figures covering imports and exports from the leading consuming and producing markets follow.

PLAN OF THE SECTION

The statistics included in this section have been chosen for their constant importance to the rubber industry. The tables are reprinted in the same relative position in every issue, each table being kept current by the addition of new figures as soon as they become available. The section accordingly affords the most up-to-date, complete and convenient statistical service in the industry.

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U. S. Imports and Exports of Crude Rubber

	Gross Imports			Re-exports			Net Imports
YEARS	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons
1921	185,394	73,772,677	17.76	5,716	2,414,924	18.86	179,678
1922	301,076	101,843,188	15.10	4,809	1,921,828	17.84	296,267
1923	309,144	185,060,304	26.72	8,772	5,672,319	28.87	300,372
1924	328,056	174,231,331	23.71	10,309	6,057,637	26.23	317,747
1925	396,642	429,705,014	48.36	14,827	19,847,753	59.76	381,815
1926	413,338	505,817,807	54.63	17,671	22,470,583	56.77	395,667
1927	426,258	339,874,774	35.60	27,775	24,735,488	39.76	398,483
1926:							
Jan.	42,404	72,528,151	76.36	2,059	3,747,505	81.24	40,345
Feb.	32,865	58,733,370	79.78	1,430	2,280,168	71.17	31,435
Mar.	42,152	70,589,581	74.76	1,836	2,735,234	66.51	40,316
Apr.	34,544	48,742,539	62.99	1,128	1,605,093	63.58	33,416
May	29,756	36,896,080	55.35	1,052	1,558,987	66.17	28,704
June	24,900	34,498,561	61.85	1,105	1,371,217	55.41	23,795
July	35,820	33,061,281	41.20	1,554	1,743,854	50.09	34,266
Aug.	27,400	24,670,762	40.21	1,318	1,339,563	45.38	26,082
Sept.	37,112	32,625,032	39.25	1,437	1,519,870	47.20	35,675
Oct.	29,746	25,320,558	38.49	1,366	1,316,270	43.03	28,110
Nov.	39,155	34,890,536	39.78	1,482	1,411,517	42.51	37,673
Dec.	37,754	33,261,366	39.33	1,904	1,841,305	43.16	35,850
1927:							
Jan.	43,340	36,753,719	37.86	1,525	1,444,734	42.28	41,815
Feb.	28,337	23,110,257	36.41	2,451	2,277,297	41.47	25,886
Mar.	35,515	28,693,016	36.07	2,763	3,249,665	52.50	32,752
Apr.	46,202	37,321,505	36.06	1,575	1,428,425	40.48	44,627
May	36,518	30,984,377	37.88	2,782	2,501,562	40.14	33,736
June	33,045	27,850,014	37.62	1,775	1,550,592	39.00	31,270
July	37,677	31,678,259	37.53	1,958	1,560,853	35.59	35,719
Aug.	32,810	26,396,931	35.92	1,809	1,382,768	34.12	31,001
Sept.	33,301	25,314,412	33.94	3,500	3,036,929	38.74	29,801
Oct.	30,184	22,163,282	32.78	2,513	2,042,713	36.29	27,671
Nov.	38,592	27,395,428	31.69	2,469	2,014,196	36.43	36,123
Dec.	30,737	22,213,574	32.26	2,655	2,245,754	37.77	28,082
1928:							
Jan.	39,107	30,278,444	34.56	1,988	1,734,990	38.95	37,119
Feb.	33,663	27,763,655	36.82	2,738	2,229,589	36.35	30,925
Mar.	40,611	32,103,042	35.29	3,718	2,587,435	31.07	36,893
Apr.	37,935	27,287,266	32.11	2,272	1,415,024	27.80	35,663
May	31,059	19,058,672	27.39	2,399	1,386,307	25.80	28,660
June	27,765	14,121,219	22.71	2,621	1,400,697	23.86	25,144
July	31,258	14,144,765	20.20	3,087	1,451,446	20.99	28,171
Aug.	31,204	12,860,150	18.39	2,377	1,084,646	20.37	28,827
Sept.	39,835	16,512,019	18.50	3,038	1,384,148	20.34	36,797
Oct.	44,058	18,200,332	18.44	2,405	1,085,407	20.15	41,653
Nov.	36,519	14,878,441	18.19	2,788	1,207,089	18.52	33,731
Dec.							

U. S. Consumption of Crude Rubber

(Rubber Association of America statistics raised to 100 per cent—All figures in long tons)

Figures on Monthly Basis

	1921	1922	1923	1924	1925	1926	1927	1928
Jan.	5,045	16,938	30,106	29,058	29,638	32,196	31,518	34,403
Feb.	5,955	14,767	30,149	25,736	29,761	31,136	30,137	33,702
Mar.	9,190	21,408	36,629	28,385	33,498	32,936	36,141	35,688
Apr.	13,084	19,294	29,085	27,129	34,139	32,696	35,871	32,772
May	16,023	23,246	36,155	25,845	35,322	29,364	34,592	37,333
June	16,142	31,713	24,272	22,753	35,822	28,598	33,801	37,676
July	18,310	24,522	17,685	23,396	36,053	27,577	29,219	37,407
Aug.	23,649	29,631	20,359	28,982	35,909	34,533	33,460	42,927
Sept.	16,705	24,410	17,594	31,497	31,691	32,904	27,214	39,882
Oct.	16,814	26,881	21,321	31,520	29,047	29,836	26,790	40,857
Nov.	14,105	24,950	20,437	27,289	28,853	28,080	26,792	37,461
Dec.	15,482	25,070	21,902	27,199	28,748	26,293	25,492	
Totals	170,504	282,560	305,694	328,769	388,481	366,149	371,027	

Figures on Quarterly Basis

Quarter	1921	1922	1923	1924	1925	1926	1927	1928
Jan./Mar.			96,776	87,609	95,263	94,301	99,216	103,558
Apr./June	65,463	127,360	89,493	75,674	104,099	87,109	103,242	103,500
July/Sept.			55,621	83,813	99,493	93,793	89,210	117,573
Oct./Dec.	105,962	155,067	63,617	92,656	85,789	83,212	80,860	
Totals	171,425	282,427	305,507	339,752	384,644	358,415	372,528	324,631

Note—The Rubber Association estimates its monthly rubber consumption figures to be 90 per cent complete. Up until 1925 the quarterly figures were likewise estimated to be 90 per cent complete; beginning with 1925 an estimate of 92 per cent completeness has been used. These estimates have been used in raising the figures in this table to 100 per cent. The quarterly figures are generally regarded as the most authentic; the monthly figures may be accepted as preliminary.

Rubber Invoiced to the U. S.

(Reported by American Consuls—Quantities in Long Tons)

During the Week Ended	From Br. Malaya	From Ceylon	From Dutch East Indies	From London & Liverpool	Total
Oct. 27	2,784	981	2,358	788	6,911
Nov. 3	6,097	1,121	3,402	1,130	11,750
Nov. 10	11,137	1,257	2,161	319	14,874
Nov. 17	11,171	1,557	1,573	533	14,834
Nov. 24	13,920	935	1,911	363	17,129
Dec. 1	10,731	1,265	2,624	963	15,583
Dec. 8	10,061	1,443	1,694	17	13,215
Dec. 15	9,785	1,661	2,215	330	13,991
Dec. 22	10,697	1,766	1,642	96	14,201
Dec. 29	8,613	577	2,197	8	11,395

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Ave.
1926																																
April	59	—	59	59	59	58	56½	56½	53	53	51½	50½	49¼	47½	48½	47	47½	48½	48	48	47¾	49	48	48½	48	48	48	48	49	48½	—	51¼
May	48½	—	50	50¼	49½	49¾	49¾	—	—	49	49½	48½	—	47¾	—	—	47½	47½	—	47½	47¾	46¾	46	—	45	46	45	45	—	—	—	47¾
June	41½	42	41½	42	41½	41½	41½	41½	43	41¾	42	—	42	43	43	43	43	43	43	44	44	44	43½	43½	42	42	42	42	42	—	—	43½
July	42	42	42	42½	41½	41½	41½	41½	41½	42½	42½	41½	41½	41½	40	40	40	40	40	40	41½	41	41½	41½	41	41½	41½	41	41	39¾	39½	41½
August	—	—	—	39¾	40¼	40¼	40¼	40¼	41½	40¼	40¼	37½	37½	38½	38½	38½	37½	37½	38½	39	39	39½	39	39¾	41½	39	39	39½	42	42¼	39½	38½
September	40¼	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¼	40¼	40½	40½	40½	41	41½	42¼	42¼	42	42¼	42¼	42¼	42¼	42¼	42½	42½	42½
October	43	—	43	43	43	42¾	42¾	42½	42½	42½	42½	42½	42½	42½	43	43½	42½	42½	42½	42½	42½	42½	42½	42½	42½	42½	42½	42½	42½	42½	42½	42½
November	41¼	—	41	41¼	41¼	41½	41½	41½	41½	41½	42¾	41¾	41¾	41¾	40¾	40¾	40½	41½	39½	39	—	38	38½	38½	38	38	38	38	38½	38¾	38¼	38¾
December	36¾	37½	37½	37½	—	37	37	37½	37	37	37½	—	37½	37½	37¾	38	38	38	38	38	38¼	38½	38¾	38¾	39	39	39	39	38½	38¾	—	38¾
1927																																
January	—	38½	39	39	39¼	39¾	40¾	40¾	—	40½	40%	40%	40%	39¾	39%	39¾	39¾	38%	38%	38¾	38¾	38%	38¾	38¼	38¾	38¾	38¾	38¾	38	38	—	38%
February	37¾	37%	37½	37½	—	—	37%	37%	37%	—	38	38	38%	38%	38	38	38%	38%	38%	38%	38%	38½	39	39¾	39	39	39	39	39	41¼	41¼	38¾
March	39¾	39%	40	40¾	41	41¼	40%	40%	40%	40%	41½	41½	41½	41½	41¼	41¼	41½	41½	41½	41½	41%	41¼	41¼	41½	41	41½	41½	41½	41	40½	40½	41
April	41¼	41½	—	40¾	41¼	41¼	41¼	41¼	41¼	41¼	41½	41½	41½	41½	41¼	40¾	40¾	40¾	40¾	40¾	40%	40¾	40¾	40¾	40½	40½	40½	40½	40½	40¾	40¾	40%
May	—	40¾	40¾	40½	41	41	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	41	41	41	41	40½	40½	40½	40¾	40¾	40¾	40¾
June	40%	40¼	40¼	40¼	40¼	40¼	39½	39½	39½	39½	39½	39½	39½	39½	39½	39½	39½	39½	39½	39½	39½	39½	39½	39½	39½	39½	39½	39½	39½	39½	39½	39½
July	35½	—	—	35½	35½	35½	34%	34%	34%	34%	34%	34%	34%	34%	34%	34%	34%	34%	34%	34%	34%	34%	34%	34%	34%	34%	34%	34%	34%	34%	34%	34%
August	35½	35¼	35¼	35¼	35%	35½	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%
Sept.	34	33%	33%	—	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%
Oct.	33%	—	—	33¼	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%
Nov.	35	35¼	35¼	35%	35%	36%	36%	36%	36%	36%	36%	36%	36%	36%	36%	36%	36%	36%	36%	36%	36%	36%	36%	36%	36%	36%	36%	36%	36%	36%	36%	36%
Dec.	40½	40%	40%	40%	40%	40%	40½	40	40½	40½	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
1928																																
January	—	37½	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%
February	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%
March	29	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%
April	—	27%	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½
May	17½	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%
June	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%
July	19½	19½	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%
August	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
September	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
October	18%	18½	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%
November	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%
December	17%	—	17%	17%	17%	17%	17%	17%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	17%	17%	17%	17%	17%	18%	18
1929																																
January	—	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18

Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Market)

Average Price per Pound for Years 1910-1921

Year	Cents	Year	Cents	Year	Cents
1910	206.60	1914	65.33	1918	60.15
1911	141.30	1915	65.85	1919	48.70
1912	121.60	1916	72.50	1920	36.30
1913	82.04	1917	72.23	1921	16.36

Average Monthly Price per Pound Since 1922

Months	1922 Cents	1923 Cents	1924 Cents	1925 Cents	1926 Cents	1927 Cents	1928 Cents
Jan.	18.82	32.73	25.86	36.71	79.50	38.75	40.25
Feb.	16.12	35.14	25.29	36.01	62.25	38.25	32.75
Mar.	14.53	34.21	22.83	41.00	59.00	41.04	26.82
Apr.	15.99	32.48	22.51	43.64	51.25	40.86	18.97
May	15.25	27.39	18.89	58.47	47.75	40.76	18.99
June	15.11	26.88	18.81	77.26	42.50	37.25	19.59
July	14.67	26.10	22.16	103.16	41.03	23.44	19.40
Aug.	13.93	28.84	26.17	82.99	38.50	35.12	19.46
Sept.	14.44	28.95	27.56	88.88	41.00	33.67	18.47
Oct.	19.78	26.93	31.13	98.01	42.50	34.32	18.83
Nov.	23.88	27.14	34.33	104.80	38.50	37.58	18.26
Dec.	27.42	26.60	37.88	98.51	38.25	40.63	17.97
Average for Year	17.50	29.45	26.20	72.46	48.50	37.72	22.48

London Closing Prices of Ribbed Smoked Sheet

(In Pence Per Pound)

Day	Oct.	Nov.	Dec.	Jan.	Day	Oct.	Nov.	Dec.	Jan.
1	8½	8⅞	8½	—	17	8⅞	8⅝	8½	—
2	8⅝	8⅞	—	8⅝	18	9	—	8⅝	—
3	8½	8⅞	8½	8⅝	19	8⅞	8½	8⅝	—
4	8½	—	8½	8⅝	20	8⅞	8⅝	8⅝	—
5	8¾	8⅞	8½	—	21	—	8⅝	8⅝	—
6	8⅞	8⅞	8½	—	22	8¾	8⅝	8⅝	—
7	—	8⅞	8⅝	—	23	8⅞	8⅝	—	—
8	8¾	8⅞	8½	—	24	8⅞	8⅝	8⅝	—
9	8¾	8¾	—	—	25	8⅞	—	—	—
10	8¾	8¾	8½	—	26	8⅞	8⅝	8⅝	—
11	8⅞	—	8½	—	27	8⅞	8⅝	8⅝	—
12	9	8½	8½	—	28	—	8½	8⅝	—
13	—	8¼	8½	—	29	8⅞	8½	8¾	—
14	—	8¼	8½	—	30	8⅞	8½	—	—
15	9	8⅛	8½	—	31	8⅞	—	8⅝	—
16	8⅞	8⅛	—	—					

Average Monthly Price Per Pound

Month	1926 Pence	1927 Pence	1928 Pence	Month	1926 Pence	1927 Pence	1928 Pence
Jan.	38.750	19.410	19.310	Aug.	19.465	17.202	9.300
Feb.	30.460	19.021	15.713	Sept.	20.197	16.293	8.530
Mar.	29.130	20.125	12.736	Oct.	20.909	16.366	
Apr.	24.260	19.897	8.864	Nov.	19.818	18.159	
May	22.520	19.769	8.845	Dec.	18.516	19.690	
June	20.423	17.880	9.293	Average for Year	23.750	18.375	
July	20.293	16.770	9.312				

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Day of Month	Dec.	Jan.	Day of Month	Dec.	Jan.	Day of Month	Dec.	Jan.
1	20.40	——	11	20.55	——	21	20.40	——
2	——	20.10	12	20.50	——	22	20.50	——
3	20.45	20.25	13	20.60	——	23	——	——
4	20.45	20.00	14	20.55	——	24	20.55	——
5	20.55	——	15	20.35	——	25	——	——
6	20.35	——	16	——	——	26	20.50	——
7	20.40	——	17	20.50	——	27	20.30	——
8	20.00	——	18	20.55	——	28	20.55	——
9	——	——	19	20.55	——	29	20.55	——
10	20.00	——	20	20.50	——	30	——	——
						31	20.55	——

Average Monthly Price Per Pound

Month	1926 Cents	1927 Cents	1928 Cents	Month	1926 Cents	1927 Cents	1928 Cents
Jan.	20.85	13.42	19.12	Aug.	18.57	20.04	19.28
Feb.	20.60	14.10	18.40	Sept.	17.02	21.95	18.67
Mar.	19.35	14.32	19.38	Oct.	12.86	20.22	19.62
Apr.	19.13	14.75	20.63	Nov.	12.86	20.22	19.84
May	18.92	16.07	21.58	Dec.	12.68	19.58	20.22
June	18.57	16.85	21.50	Average for Year	17.53	17.49	19.97
July	18.71	18.00	21.36				

Stock of Crude Rubber in the U. S.

(All Quantities in Long Tons)

At	ON HAND			AFLOAT			ON HAND AND AFLOAT		
End of	1926	1927	1928	1926	1927	1928	1926	1927	1928
Jan.	55,198	76,172	110,244	46,296	45,312	41,256	100,434	121,484	151,500
Feb.	58,035	91,186	108,955	46,935	42,166	43,316	104,970	133,352	152,271
March	61,822	85,740	114,061	43,567	49,600	39,324	105,389	135,340	153,385
April	55,261	92,757	113,083	41,905	38,963	33,986	97,166	131,720	147,069
May	64,360	94,563	105,356	40,303	44,181	34,374	104,663	138,744	139,730
June	60,460	89,250	90,198	40,907	47,233	40,001	101,367	136,483	130,119
July	64,900	98,469	83,242	38,062	40,587	42,304	102,962	139,056	125,546
Aug.	60,870	96,148	68,994	37,360	40,937	51,875	98,230	137,085	120,869
Sept.	62,078	97,829	68,851	42,464	37,966	48,566	105,542	135,793	117,417
Oct.	64,089	97,452	66,421	52,930	42,804	41,571	117,919	140,256	107,992
Nov.	69,385	101,034	61,956	47,311	37,076	68,119	116,696	138,110	130,075
Dec.	72,520	100,130		52,020	47,938		124,540	148,068	

(Rubber Association of America figures raised to 100%.)

Stock of Crude Rubber in London

(No. of tons in Wharves and Warehouses, including Latex)

At end of:	1920	1921	1922	1923	1924	1925	1926	1927	1928
Jan.	19,300	56,573	67,252	73,498	57,460	27,172	9,994	54,994	66,524
Feb.	18,329	59,439	67,623	70,483	56,732	23,425	10,004	58,826	62,964
Mar.	18,969	63,913	66,670	63,438	55,647	18,104	13,127	63,055	58,272
Apr.	20,072	68,759	68,637	58,770	54,559	12,949	18,773	66,897	53,425
May	20,921	70,403	70,146	54,429	51,615	5,895	20,384	67,169	44,628
June	22,517	69,408	71,597	51,050	51,115	5,318	23,984	63,902	38,756
July	25,346	71,065	71,515	49,937	52,073	4,258	27,727	63,717	35,429
Aug.	30,674	73,211	72,112	58,427	49,700	4,619	30,165	64,491	32,084
Sept.	35,504	72,175	70,977	54,523	44,011	5,453	35,077	68,236	31,440
Oct.	41,743	69,229	68,536	58,891	37,523	5,086	42,138	69,569	
Nov.	45,550	70,786	68,548	60,074	33,593	3,869	44,057	67,050	
Dec.	50,652	69,792	72,299	60,246	29,488	5,697	48,918	63,793	

At End of Recent Weeks

	First Saturday	Second Saturday	Third Saturday	Fourth Saturday	Fifth Saturday
1927					
December	65,869	66,011	64,761	63,397	63,207
1928					
January	64,360	65,524	65,450	66,285	———
February	65,909	64,945	63,769	63,103	———
March	61,978	61,920	61,033	59,644	58,197
April	58,732	58,945	56,819	53,360	———
May	52,015	50,837	48,705	44,628	———
June	43,716	42,683	41,185	40,083	38,611
July	36,915	35,925	35,238	35,445	———
August	34,294	33,649	32,591	32,815	———
September	31,933	31,477	32,110	31,884	31,462
October	29,525	27,370	26,477	24,240	
November	22,919	21,494	20,194	18,724	———
December	16,855	16,517	17,669	18,821	———

Rubber in Singapore and Penang

(Stocks held by Dealers—Quantities in Long Tons)

End of	1926	1927	1928	End of	1926	1927	1928
Jan.	16,726	25,440	25,868	July	23,101	22,558	18,663
Feb.	13,653	26,766	22,867	Aug.	23,362	25,764	18,971
Mar.	18,389	27,844	20,538	Sept.	25,997	25,178	14,898
Apr.	16,328	24,543	16,946	Oct.	26,614	25,790	12,149
May	16,967	25,133	17,437	Nov.	25,486	28,369	29,188
June	19,416	21,898	18,207	Dec.	26,443	25,798	

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total	Per Cent Balloons		Total	Per Cent Balloons
1922	16,297,735	0.0	1925	26,001,664	66.8
1923	23,140,620	0.6	1926	24,199,524	78.8
1924	21,863,311	19.7	1927	19,700,003	79.1
1928			1928		
January	1,811,534	87.8	July	2,209,692	85.9
February	1,806,437	86.5	August	2,318,898	80.2
March	2,420,084	86.4	September	2,315,604	76.9
April	2,316,324	88.4	October	2,114,611	72.2
May	2,185,592	84.0	November	1,213,245	66.4
June	2,429,453	83.1	December	———	—

U. S. Consumption of Gasoline

(In Barrels of 42 Gallons)

MONTHS	1924	1925	1926	1927	1928
January	11,918,000	14,386,000	17,582,000	17,888,000	20,939,000
February	9,626,000	13,210,000	15,814,000	18,240,000	21,136,000
March	10,961,000	14,890,000	19,302,000	22,464,000	24,041,000
April	14,583,000	19,013,000	20,848,000	23,371,000	25,712,000
May	15,889,000	20,459,000	24,213,000	26,579,000	27,355,000
June	16,421,000	20,724,000	23,803,000	27,799,000	29,022,000
July	18,610,000	22,879,000	24,762,000	29,784,000	30,960,000
August	19,825,000	22,323,000	26,912,000	29,779,000	33,148,000
September	16,871,000	20,177,000	22,929,000	28,409,000	29,691,000
October	18,029,000	19,826,000	23,973,000	25,497,000	30,610,000
November	16,607,000	18,024,000	20,618,000	24,400,000	26,222,000
December	15,663,000	17,954,000	21,419,000	23,718,000	
TOTAL	185,003,000	223,865,000	262,165,000	297,928,000	

U. S. Tire and Tube Statistics

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Figures for Recent Years

	1922	1923	1924	1925	1926	1927
Production	40,932	45,259	51,633	60,845	61,237	64,439
Shipments	39,987	45,204	50,120	59,262	59,002	64,059
Inventory[2]	6,132	5,772	7,427	8,142	10,456	10,264

Figures for Recent Months

	PRODUCTION			SHIPMENTS			INVENTORY		
	1926	1927	1928	1926	1927	1928	1926	1927	1928
Jan.	4,587	4,965	5,491	2,974	4,932	5,394	9,947	10,432	9,949
Feb.	4,865	5,095	6,363	3,436	4,458	5,031	11,164	11,075	11,721
Mar.	5,456	6,276	6,819	4,561	5,701	5,731	12,004	11,583	12,389
Apr.	5,846	6,299	6,178	4,980	5,701	5,812	12,461	12,122	12,717
May	5,023	6,151	6,759	5,211	5,657	6,457	12,343	12,462	13,024
June	5,422	6,202	6,692	5,724	6,253	7,117	11,968	12,462	12,162
July	4,950	5,087	6,498	6,337	5,973	7,895	10,592	11,326	11,157
Aug.	5,872	5,752	7,469	6,744	6,393	8,403	9,732	10,721	10,084
Sept.	5,706	4,822	6,802	6,040	5,717	7,145	9,318	9,722	9,765
Oct.	5,103	4,773	7,326	4,544	4,799	5,717	9,917	9,665	11,520
Nov.	4,324	4,502		3,733	4,306		10,297	10,136	
Dec.	4,683	4,497		4,718	4,165		10,456	10,264	

AUTOMOBILE INNER TUBES

Figures for Recent Years

	1922	1923	1924	1925	1926	1927
Production	50,850	60,116	70,706	82,614	76,618	70,823
Shipments	49,673	59,072	68,016	81,004	71,591	72,896
Inventory[2]	7,643	8,425	11,052	11,313	16,200	13,692

Figures for Recent Months

	PRODUCTION			SHIPMENTS			INVENTORY		
	1926	1927	1928	1926	1927	1928	1926	1927	1928
Jan.	6,809	5,337	5,441	3,723	6,016	6,072	14,361	15,585	12,982
Feb.	6,825	5,658	6,895	3,736	5,120	5,431	17,090	16,075	14,650
Mar.	7,030	7,184	6,231	4,987	6,157	5,731	19,131	17,096	15,573
Apr.	6,554	7,373	6,661	5,051	6,359	5,702	20,674	17,801	16,638
May	6,149	6,737	7,168	6,304	6,140	6,300	21,141	18,389	17,702
June	6,171	6,306	6,953	6,898	6,832	7,136	20,243	17,858	17,159
July	5,729	5,284	6,674	8,569	7,070	8,729	17,267	16,004	14,974
Aug.	7,424	6,480	8,343	9,579	7,983	9,350	15,462	14,664	13,931
Sept.	7,590	5,651	7,103	7,762	6,758	7,154	15,312	13,511	13,543
Oct.	6,208	5,065	6,929	5,474	5,024	5,662	15,929	13,539	15,285
Nov.	4,852	4,775		4,045	4,723		16,604	13,585	
Dec.	5,277	4,969		5,463	4,712		16,200	13,692	

(1) Rubber Association of America figures, raised to 100%. The Association estimates its figures to be 75% representative or complete when issued and that basis has been accepted when preparing the statistics in this table.

(2) Held by manufacturers at end of period indicated.

Automobile Production

	United States			Canada			
	Total	Passenger Cars	Trucks	Total	Passenger Cars	Trucks	Grand Total
1921	1,595,304	1,452,902	142,402	66,246	61,098	5,148	1,661,550
1922	2,547,208	2,302,923	244,285	102,053	94,904	7,149	2,649,261
1923	4,020,255	3,631,728	388,527	146,438	129,228	17,210	4,166,693
1924	3,600,918	3,203,049	397,869	135,246	117,765	17,481	3,736,164
1925	4,265,704	3,760,459	505,245	161,389	139,311	22,078	4,427,093
1926	4,298,799	3,808,753	490,046	205,092	164,483	40,609	4,503,891
1927							
Jan.	238,926	199,650	39,276	15,376	11,745	3,631	254,302
Feb.	304,758	264,171	40,587	18,655	14,826	3,829	323,413
March	394,430	345,911	48,519	23,250	19,723	3,527	417,680
April	404,743	357,009	47,734	24,611	20,890	3,721	429,354
May	404,099	357,148	46,951	25,708	21,991	3,717	429,807
June	321,959	278,728	43,231	19,208	16,470	2,738	341,167
July	268,474	236,866	31,608	10,987	8,719	2,268	279,461
Aug.	308,807	274,378	34,429	12,526	10,139	2,387	321,333
Sept.	260,420	226,440	33,980	11,262	8,681	2,581	271,682
Oct.	219,712	183,041	36,671	7,791	6,236	1,555	227,503
Nov.	134,381	109,742	24,639	6,617	5,173	1,444	140,998
Dec.	133,178	105,784	27,394	3,435	2,277	1,158	136,613
TOTAL	3,393,887	2,938,868	453,019	179,426	146,870	32,556	3,573,313
1928							
Jan.	225,039	199,032	26,007	8,463	6,705	1,758	282,502
Feb.	323,368	290,830	32,358	12,504	10,315	2,189	335,872
March	412,825	371,408	41,417	9,724	7,478	2,246	422,549
April	409,948	364,877	45,071	24,240	20,546	3,694	434,188
May	425,990	375,798	50,192	33,942	29,764	4,178	459,932
June	396,967	356,439	40,528	28,399	25,341	3,058	425,366
July	390,445	237,933	52,512	25,226	20,122	5,104	415,671
Aug.	458,429	400,689	57,740	31,245	24,274	6,971	489,674
Sept.	413,722	358,872	54,850	21,193	16,572	4,621	434,915
Oct.	397,096	339,976	57,120	18,536	13,016	5,520	415,632
Nov.	256,936	217,256	39,680	11,769	8,154	3,615	268,705
Dec.							

Exports of Crude Rubber from Principal Producing Countries

(*Long Tons*)

	BRITISH MALAYA[1]							DUTCH EAST INDIES[3]						
	Gross Exports	Imports	Gross Exports Minus Imports	Ceylon[2]	India & Burma[2]	Sarawak[4]	British North Borneo[4]	Siam[4]	Java & Madura	Sumatra E. Coast	Other D.E.I.	Indo-China[5]	Amazon Valley	All Other[6]	World Total[7]
1923	252,016	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32,930	46,344	57,822	5,067	16,765	7,856	406,955
1924	259,706	108,524	151,182	39,997	7,597	6,499	4,621	2,962	42,446	54,497	80,347	6,688	23,165	9,065	429,366
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	517,523
1926	391,328	151,243	240,085	58,962	9,874	9,155	6,079	4,027	52,186	71,415	121,231	8,203	24,298	16,017	621,530
1927	371,322	182,845	188,477	55,356	11,321	10,923	6,582	5,472	55,297	77,815	142,171	8,645	28,782	15,633	606,474
1926:															
Oct.	39,367	15,203	24,164	5,672	634	805	473	385	4,058	6,998	11,491	661	1,904	1,023	53,268
Nov.	34,502	12,201	22,101	4,228	1,110	685	547	285	3,988	5,816	9,422	718	1,911	1,259	52,070
Dec.	36,811	14,716	22,095	6,498	1,176	895	617	338	5,054	7,117	12,786	790	3,821	714	61,901
1927:															
Jan.	34,946	14,995	19,951	6,697	921	959	585	304	4,187	6,706	10,690	941	3,482	981	56,404
Feb.	27,528	11,697	15,831	3,571	1,469	552	445	360	4,078	6,526	10,585	675	2,104	1,098	47,344
Mar.	41,346	17,464	23,882	7,142	1,124	997	639	432	5,657	7,004	12,905	733	3,178	1,791	65,484
Apr.	29,041	13,069	15,972	3,349	723	984	452	526	4,666	5,531	10,197	557	2,451	1,520	46,928
May	31,393	15,491	15,902	3,124	760	788	415	348	5,430	5,529	13,410	586	2,460	1,207	49,957
June	32,607	14,706	17,901	3,348	856	1,100	539	409	4,818	5,518	9,109	772	889	1,731	46,990
July	23,947	12,697	11,250	4,018	827	859	544	333	4,771	6,142	11,566	519	1,757	1,113	43,699
Aug.	30,371	17,105	13,266	5,357	688	1,133	623	546	4,355	6,682	12,440	716	1,928	969	48,703
Sept.	29,835	12,095	17,740	4,911	479	645	566	498	3,635	5,957	9,853	497	2,072	1,213	48,066
Oct.	29,846	15,801	14,045	5,245	802	721	591	542	3,810	7,755	13,633	775	2,752	939	51,520
Nov.	28,277	19,860	8,417	4,464	1,277	1,241	591	600	4,127	6,587	14,395	683	2,369	1,627	46,378
Dec.	32,185	17,865	14,320	4,130	1,395	946	592	664	5,763	7,878	13,438	1,191	3,340	1,444	55,101
1928:															
Jan.	27,789	16,618	11,171	3,830	1,605	842	581	525	4,851	7,988	11,360	1,100	2,273	1,025	47,151
Feb.	28,848	12,911	15,937	4,947	1,081	667	581	536	4,052	6,757	8,635	787	1,612	1,276	46,868
Mar.	27,879	10,508	17,371	3,683	775	645	581	269	3,999	5,826	9,690	700	2,750	1,211	47,500
Apr.	20,139	9,335	10,804	3,233	789	630	500*	258	3,993	5,040	5,538	736	1,014	1,323	33,858*
May	26,483	10,350	16,133	3,091	654	842	500*	241	4,943	5,355	10,382	717	2,062	1,135	46,055*
June	22,994	16,168	6,826	3,107	963	926	500*	451	5,419	5,863	13,623	725	1,399	960	40,762*
July	30,405	13,383	17,022	5,129	1,043	905	500*	366	5,602	7,566	11,424	744	1,264	873	52,438*
Aug.	35,593	15,114	20,479	5,720	398	1,227	500*	544	5,668	7,438	11,798	779	1,732	450	56,733*
Sept.	29,700	11,239	18,461	4,675	457	938	500*	447	4,956	6,536	9,791	1,112	1,614	494	49,981*
Oct.	24,441	12,603	11,838	3,999	864	949	500*	457	5,295	7,474	9,977	566	1,399	732	44,050*
Nov.	68,072	10,436	57,636	8,705	1,048	772	500*	425	4,950	7,902	7,805	943	1,790	596*	93,072*
Dec.	66,763	11,112	55,651	8,127											

(1) Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 115 tons in 1923, 1,117 in 1924, 3,618 in 1925, 3,263 in 1926, and 2,439 in 1927. (2) Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included—such shipments were equivalent to 18 tons in 1923, 93 tons 1924, 6 tons 1925, 20 tons in 1926, and about ½ ton in 1927. (3) Official statistics. (4) Imports into Singapore and Penang. (5) Exports from "Other D.E.I" are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 2,342 tons in 1923, 1,008 tons 1924, 2,239 tons 1925, 44 tons in 1926, and 84 tons in 1927. (6) Calculated from official import statistics of principal consuming countries, viz., United States, United Kingdom, France, Germany, Belgium and Netherlands. This figure includes guayule rubber. (7) This total includes the third column for British Malaya, "Gross Exports minus Imports," and all the figures shown for the other territories. *Figure is provisional; final figure will be shown immediately it becomes available.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(*Long Tons*)

	United States*	United Kingdom	France (h)	Germany	Canada (ac)	Japan (ac)	Italy	Russia (ce)	Australia (cd)	Belgium (d)	Netherlands	Scandinavia (abcdf)	Spain (g)	Czechoslovakia (abcd)	World Total
1919	236,977	42,671	17,685	5,584	6,395	9,753	9,894	75	1,002	3,995	2,771	3,149	2,418	9	342,378
1920	248,762	56,844	13,885	11,890	11,746	5,297	6,123	62	1,815	3,840	5,510	2,292	2,008	567	370,641
1921	179,678	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	589	300,562
1922	296,267	11,724	24,352	27,546	9,207	15,934	6,430	2,493	2,643	172	-3,807	1,778	589	567	395,885
1923	300,372	12,700	27,392	18,519	13,277	15,372	9,489	2,986	1,649	2,184	792	2,528	630	1,128	408,018
1924	317,747	-11,550	30,446	22,727	14,299	19,571	8,764	2,346	3,124	2,688	-807	3,178	944	1,370	414,847
1925	381,815	4,061	32,956	35,937	19,683	11,117	11,412	7,088	4,757	2,930	875	3,149	1,155	1,558	516,498
1926	395,667	84,865	34,240	22,775	20,229	18,128	9,809	6,529	9,021	2,498	2,670	4,046	1,299	1,870	613,643
1926:															
September	35,675	8,843	1,774	2,029	1,855	1,922	819	472	1,241	283	429	317	91	138	55,888
October	28,110	8,082	3,376	2,423	1,865	2,396	645	585	1,004	361	2	360	100	121	49,370
November	37,673	9,247	2,719	3,007	1,548	3,380	832	568	916	194	-18	358	90	181	60,695
December	35,850	4,749	2,890	2,562	1,347	856	439	725	777	248	156	443	151	306	51,999
1927:															
January	41,815	10,192	3,284	2,481	1,936	1,227	672	803	929	296	192	316	139	100	64,382
February	25,886	7,692	3,263	3,108	2,620	1,902	601	907	460	502	152	336	146	210	47,780
March	32,752	9,049	2,050	3,475	3,760	1,578	852	784	780	454	86	385	137	127	56,269
April	44,627	7,875	2,310	2,393	1,509	2,181	781	1,972	762	448	58	230	177	218	65,541
May	33,736	2,896	2,006	3,380	2,519	1,084	918	887	694	626	-57	335	155	223	49,402
June	31,270	2,282	2,387	3,632	2,086	795	942	1,506	557	583	-17	243	164	193	46,616
July	35,719	1,116	2,384	2,899	2,104	1,505	1,007	415	900	429	66	227	177	236	49,184
August	31,001	3,463	2,795	3,119	2,013	1,970	1,274	386	650	604	-63	312	138	123	47,785
September	29,801	7,800	1,956	2,891	1,850	2,025	684	518	772	552	-33	451	155	272	49,694
October	27,671	5,888	3,479	4,202	1,790	1,966	1,021	1,075	908	465	156	401	153	363	49,538
November	36,123	1,687	3,661	4,209	1,916	1,575	1,167	1,312	836	749	298	474	246	317	54,570
December	28,082	309	4,696	3,108	2,302	2,710	1,462	1,453	1,242	784	-202	514	268	300	47,028
	398,483	60,249	34,271	38,892	26,405	20,521	11,381	12,018	9,490	6,492	636	4,224	2,055	2,672	627,786
1928:															
Jan.	37,119	1,921	1,764	3,485	2,290	1,361	760	755	802	589	52	261	335	376	50,870
Feb.	30,925	3,143	2,526	2,984	2,553	1,258	437	783	616	599	98	307	296	297	46,822
Mar.	36,893	3,179	1,902	3,521	2,989	1,707	763	231	918	816	95	351	497	398	54,267
April	35,663	—2,280	2,204	2,719	1,938	2,353	1,115	1,820	832	575	280	339	304	159	48,020
May	28,660	—5,823	3,210	2,944	2,180	2,306	1,095	3,893	655	746	209	485	220	213	41,487
June	25,144	—3,031	4,550	2,968	2,632	2,119	984	4,111	348	743	133	346	251	182	41,480
July	28,171	—1,374	2,652	3,387	2,692	2,042	1,599	724	591	895	395	294	175	384	42,625
Aug.	28,827	48	3,587	2,744	2,447	1,883	875	632	707	519	316	359	58	94	43,096
Sept.	36,797	4,199	3,524	3,553	2,810	1,852	1,278	20	603	597	345	377	277	235	56,467
Oct.	41,667	—934	3,728	4,386	2,943		1,049		776	696	141	527	250	318	
Nov.	33,836	—3,141		3,694	2,799		1,340								

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced 12 per cent in order to eliminate imports of gutta percha and to reduce to basis of net weight. *United States imports of guayule are not included in this compilation; such imports amounted to 4,305 tons in 1926; to 5,019 tons in 1927; and to 3,076 in the first eleven months of 1928.

BOOK REVIEWS

ANNUAL REPORT. By George K. Burgess, Director, Bureau of Standards. Published by the U. S. Department of Commerce, Washington, D. C. 1928. 52 pp.

The general activities and several of the specific problems handled by the Bureau of Standards during the year are summarized in this report. In one test, for example, the properties of six soft-rubber compounds at temperatures ranging from 70 degrees below to 147 degrees above zero (Centigrade) were determined, proving that at very low temperatures rubber becomes rigid with an increased tensile strength, while at very high temperatures it possesses practically no tensile strength. The entire year's work of the bureau is analyzed and described in brief.

INDUSTRIAL CHEMISTRY. Edited by Allen Rogers, Ph.D. Published by D. Van Nostrand Company, New York City. 1928. 2 vol., 1313 pp.

Covering the entire range of the chemical industry, these volumes describe and explain operations, methods, and processes of manufacture in their entirety. A chapter on "Rubber and Related Gums" is written by Frederic Dannerth.

RAILROAD FACTS: A YEARBOOK OF RAILROAD INFORMATION. Published by the Western Railways' Committee on Public Relations, Chicago, Ill. July, 1928. 96 pp.

This sixth edition of a valuable book of facts in regard to railroads follows the design and style of its predecessors in presenting it materially, interestingly and graphically. Railroad development, service, rates, earnings, and other subjects are treated at length, and special sections are devoted to the employes' problem and to the progress of good railroading. A feature is a presentation of the manner in which the average dollar of operating revenue is spent.

United States Imports of Guayule Rubber and Related Gums

(All quantities in Long Tons)

	Guayule		Balata		Jelutong		Gutta Percha	
	Tons	Dollars	Tons	Dollars	Tons	Dollars	Tons	Dollars
1919	1,430	760,690	727	937,038	8,332	2,213,964	2,900	1,068,698
1920	758	345,985	1,064	1,260,043	5,672	2,068,501	3,183	1,520,309
1921	58	26,945	814	1,077,859	1,745	351,893	985	333,564
1922	127	57,040	812	978,765	2,335	403,812	818	281,012
1923	1,155	542,227	700	898,524	4,565	853,308	912	375,167
1924	1,356	536,392	464	568,456	6,165	1,237,100	1,408	463,610
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	1,603	629,284
1926	4,305	2,562,096	354	327,213	7,263	3,127,757	1,445	661,156
1927	5,018	2,674,957	582	447,246	7,785	2,448,657	1,494	728,172
1928:								
Jan.	432	242,339	27	24,218	588	183,705	150	86,702
Feb.	489	281,295	33	32,165	403	142,621	312	215,085
Mar.	575	365,927	32	26,460	829	388,616	115	57,833
Apr.	512	312,131	47	32,924	592	174,970	68	27,627
May	452	233,414	—	—	679	226,064	100	42,762
June	424	220,081	9	6,799	293	91,152	28	12,374
July	191	100,342	123	46,747	373	113,295	81	27,344
Aug.	—	—	399	165,460	451	126,962	147	60,738
Sept.	—	—	60	38,193	2,028	713,736	125	56,768
Oct.	—	—	121	59,358	429	129,065	239	94,570
Nov.	—	—	59	41,119	472	140,116	88	35,409

Reclaimed Rubber in the United States

(All Quantities in Long Tons—100% Basis)

Year	Production	Consumption	% to Crude	Stocks*	Year	Production	Consumption	% to Crude	Stocks*
1919	81,866	73,535	36.3	.....	1924	80,079	76,072	22.4	.....
1920	86,395	75,297	38.4	.....	1925	132,930	137,105	35.6	13,203
1921	36,725	41,351	24.1	.....	1926	180,582	164,500	45.9	23,218
1922	57,834	54,458	19.3	.....	1927	189,144	178,471	47.6	24,980
1923	74,766	69,584	22.7	.....					
1927:									
Jan.	16,526	12,374	39.3	25,903	July	15,488	13,842	47.4	26,599
Feb.	15,860	14,424	47.8	27,291	Aug.	15,109	15,836	47.3	25,157
Mar.	16,788	13,528	37.4	27,124	Sept.	14,392	14,790	54.3	23,429
Apr.	14,483	16,677	46.5	25,712	Oct.	16,127	17,292	64.5	22,176
May	16,159	15,754	46.1	26,419	Nov.	15,477	14,876	55.5	21,728
June	16,652	15,547	46.0	25,811	Dec.	16,083	13,431	52.7	24,980
1928:									
Jan.	14,862	18,134	52.7	21,941	July	17,278	17,173	45.9	17,305
Feb.	15,291	16,808	49.9	20,848	Aug.	19,049	15,532	36.2	15,881
Mar.	17,069	18,619	52.2	19,558	Sept.	18,693	16,022	40.2	17,991
Apr.	15,393	17,355	52.9	19,283	Oct.	17,182	16,587	41.7	17,026
May	18,945	18,201	48.8	18,137	Nov.	18,245	16,547	44.2	22,399
June	18,781	16,328	43.4	18,709	Dec.				

*Stocks on hand at the end of month or year. Exports of reclaimed rubber, not shown in this table, amounted to 8,540 tons in 1927.

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